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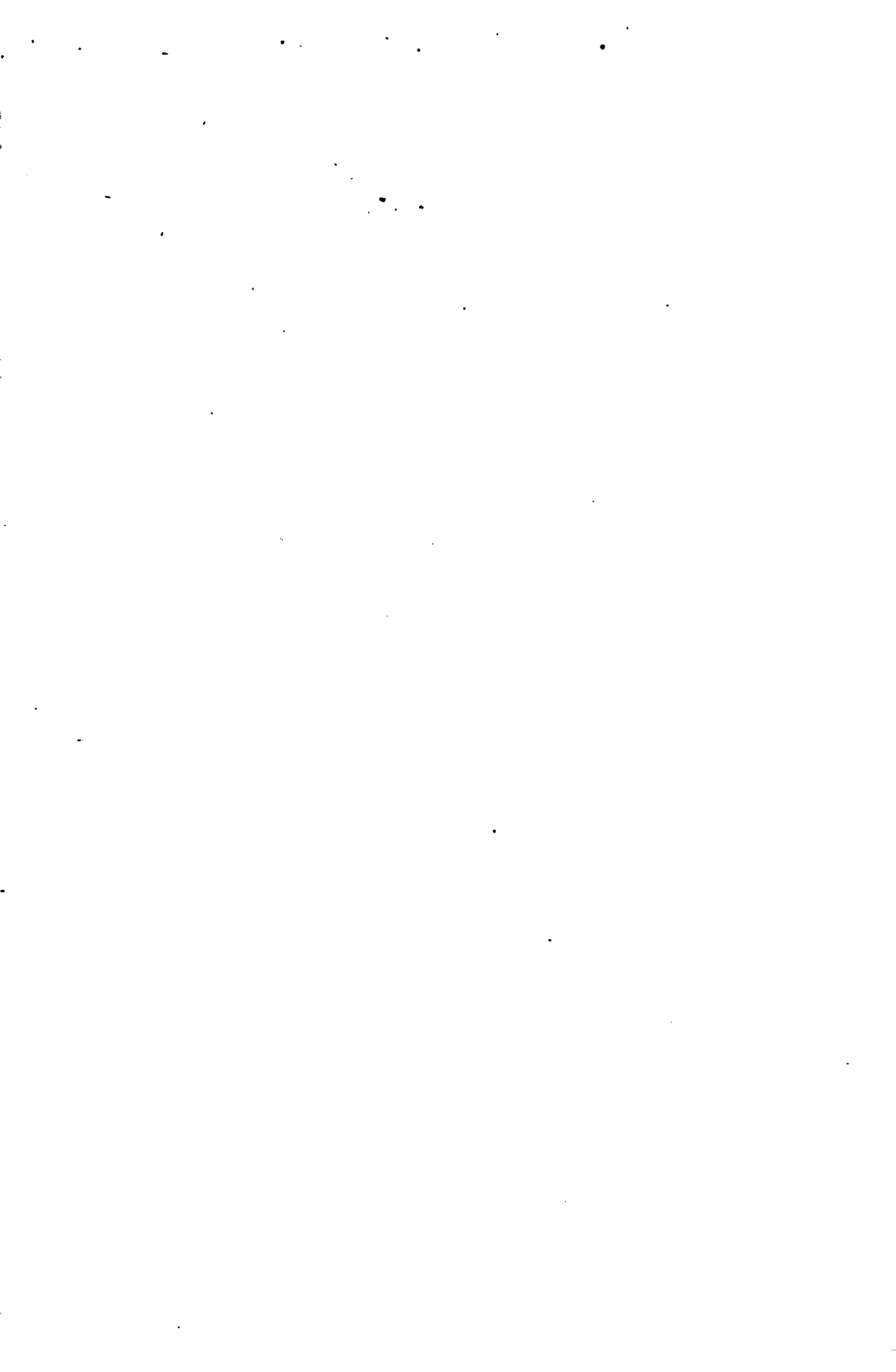
JOHN GEORGE BOURINOT, LL.D.,

CLERK OF HOUSE OF COMMONS,

OTTAWA, CANADA.

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TWENTY-SIXTH ANNUAL REPORT

OF THE

DEPARTMENT OF MARINE AND FISHERIES

1893

MARINE

PRINTED BY ORDER OF PARLIAMENT



OTTAWA

PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST
EXCELLENT MAJESTY

1894

[No. 11—1894] Price 15 cents

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John J. L. Bonar.

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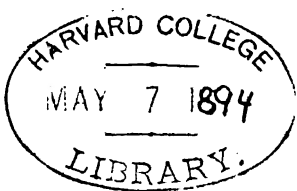
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Rev. J. G. Bonine

*To His Excellency the Right Honourable SIR JOHN CAMPBELL HAMILTON-GORDON, EARL
OF ABERDEEN, Governor General of Canada, etc., etc.*

MAY IT PLEASE YOUR EXCELLENCY :

I have the honour to submit herewith, for the information of Your Excellency and the Legislature of Canada, the Twenty-sixth Annual Report of the Department of Marine and Fisheries, Marine Branch.

I have the honour to be

Your Excellency's most obedient servant,

CHARLES HIBBERT TUPPER,

Minister of Marine and Fisheries.

**DEPARTMENT OF MARINE AND FISHERIES,
OTTAWA, 1st December, 1893.**

CONTENTS.

PAGE

REPORT SUBMITTED BY MINISTER.
REPORT OF DEPUTY MINISTER.

SUBJECTS EMBRACED IN DEPUTY MINISTER'S REPORT.

Buoys and Beacons.....	xxxv
Coasting Trade of Canada.....	cxiv
Correspondence.....	cxix
Dominion Steamers.....	xxxvi
Engineers' Certificates.....	cxlii
Georgian Bay Survey.....	cxii
Harbour Police.....	xl
Ice-boat Mail Service.....	cii
Inside Service Employees.....	cxv
Lighthouse Service.....	i
do Ontario Division.....	ii
do Quebec Division.....	ix
do Nova Scotia Division.....	xvi
do New Brunswick Division.....	xxiii
do Prince Edward Island Division.....	xxx
do British Columbia Division.....	xxxi
Longitude of Montreal.....	cxii
Live Stock, Inspection of.....	cxix
Legislation.....	cxv
Maintaining Lighthouses and Dominion Steamers.....	xl
Merchant Shipping.....	cii
Masters and Mates' Certificates.....	xli
Meteorological Service.....	cxvii
Magnetic Observatories.....	cxvii
Messenger Pigeons.....	cxix
Oils for use of Lighthouses.....	xxxv
Outside Service Employees.....	cxvi
Obstructions to Navigation, Removal of.....	cxviii
Sick and Distressed Mariners.....	cxviii
Steamboat Inspection.....	cxlii
Signal Service.....	cxix
Wrecks and Casualties.....	xlii

APPENDICES.

Expenditure, Statement of.....	1
Hydrographic Work—Report of Chief Engineer.....	28
Live Stock Shipments, Inspectors' Reports.....	62
Life-boat Stations.....	76
Legislation.....	84
Lighthouses and Agencies, Number of.....	87
Meteorological Service, Report of Director.....	3
Masters and Mates, Report of Chairman of Board.....	50
Messenger Pigeon Service.....	73
Revenue, Statement of.....	2
Rewards for Humane Service.....	88
Steamboat Inspection, Report of Chairman of Board.....	45
Signal Service—Report on.....	53
Sick Mariners' Dues, Statement of.....	91
Wharfs, Statement relating to.....	70

ALPHABETICAL INDEX

TO

DEPUTY MINISTER'S REPORT.

A.

	PAGE
Aids to Navigation, New, in Ontario.....	iii
do do Improvements, Quebec	x
Algernon Rock, Repairs.....	xii
Ash and Bloody Island, do	xii
Automatic Buoy, (Inner) Halifax.....	xxii
do Spare	xxiii
Alberton.....	xxx
Active Pass Fog-alarm.....	xxxii
American Lights.....	xxxv
"Alert".....	xxxviii

B.

Bustard Rocks Main Light.....	iv
do Front Light Inner Range.....	iv
do do do	v
Beauharnois, Repairs.....	vi
Beaujeu Bank Gas Buoy.....	xi
Batiscan Tower, Repairs.....	xii
Bird Rocks, do	xii
Bunker Island, Yarmouth.....	xvi
Bird Island.....	xviii
Baccaro.....	xx
Barrington Light-ship.....	xx
Bon Portage.....	xx
Buoy Service, Nova Scotia.....	xxi
Brazil Rock Bell-buoy.....	xxi
Bliss Island, Repairs.....	xxiii
Big Duck Island Fog-alarm do	xxiii
Bridges Point.....	xxviii
Buoys and Beacons New Brunswick.....	xxviii
Black Rock Automatic Buoy.....	xxviii
Blonde Rock do	xxix
Buoys Prince Edward Island.....	xxxii
British Columbia Lighthouse Division.....	xxxii
do Fog-alarms.....	xxxii
Beren's Island.....	xxxlii
Brocton Point.....	xxxiv
British Columbia Buoys and Beacons.....	xxxiv
do Six Foot Buoys.....	xxxiv
do Five do	xxxv
Brotchy Ledge Buoys.....	xxxv
Buoys and Beacons In the Dominion.....	xxxv
"Bayfield".....	xxxix

C

Colchester Reef, Repairs.....	vii
Corrunna, do	vii
Cove Island, do	viii
Christian Island, do	viii
Cape Salmon, Improvements.....	xi

C—Concluded.

		PAGE
Cap-aux-Oies,	Repairs.....	xiii
Cap Chatte,	do	xiii
Cape Magdalen,	do	xiii
Cape Norman,	do	xiii
Cape Ray,	do	xiii
Cape Rosier,	do	xiii
Contrecoeur,	do	xiii
Crane Island,	do	xiii
Candlebox Island.....		xvi & xxi
Country Harbour.....		xvii
Cranberry Island.....		xviii
Canso Harbour.....		xviii
Cape North.....		xix
Cape St. Lawrence.....		xix
Cheticamp.....		xix
Chebucto Head.....		xix
Croucher's Island.....		xx
Coffins Island.....		xx
Carter's Island.....		xx
Cape Negro.....		xx
Cape Roseway.....		xx
Cape Fourchu.....		xxi
Cape Enrage,	Repairs.....	xxiv
Cassies Point,	do	xxiv
Cape Spencer.....	do	xxiv
Cape Tormentine.....	do	xxviii
Chebogue.....	Ledge Buoy.....	xxix
Cape Bear.....		xxxi
Cove Head.....		xxxi
Cape Beale.....		xxxiii
Carmanah.....		xxxiii
Coasting Trade of Canada.....		cxiv
Correspondence.....		cxix

D.

Devils Island.....		xvii
Darnley Range.....		xxxi
Dominion Steamers.....		xxxvi
"Druid".....		xxxviii
"Dolphin".....		xxxviii
Dominion Steamers,	Cost of maintenance.....	xl

E.

Etang du Nord.....	Repairs.....	xiii
Eastern Harbour.....		xix
Egg Island.....		xxii
Escuminac.....	Repairs.....	xxiv
East Point, Saturna Island.....		xxxlii
Employees.....	Inside service.....	cxv
do.....	Outside service.....	cxvi

F.

French River.....	Improvements in Light.....	iv
do.....	Back Range Light.....	v
Fort William.....	Repairs.....	viii
Father Point.....	do	xiv
Fort Point.....		xx
Fish Island.....		xxi
Fort Folly.....	Repairs.....	xxiv
Fish Island.....	Malpeque.....	xxx
Fraser River.....	Buoys.....	xxxiv

G.

Giants Tomb Light.....		iii
Goderich.....	Repairs.....	viii
Green Island.....	do	xiv

INDEX.

ix

G—Concluded.

	PAGE
Gas and other buoys (Quebec).....	xv
Gillis Point.....	xvii
Gull Rock.....	xx
Grand Manan Fog Alarm.....	xxiv
Grand Lake and Jemseg.....	xxix
Grand Tracadie.....	xxxii
Grassy Point.....	xxxiv
Georgian Bay.....	cxii
Repairs.....	
Buoys.....	
Beacon.....	
Survey.....	

H.

Heath Point, Anticosti.....	xii
Hobsons Nose.....	xx
Halifax Inner Automatic Buoy.....	xxii
Hendry's Point.....	xxv
Head Harbour.....	xxv
Hay Island.....	xxv
Harbour Police.....	xl
Repairs.....	
do.....	
do.....	

I.

Isle Ouétique.....	xviii
Ingonish.....	xix
Indian Point Shippegan Range.....	xxv
Ice Boat Mail service.....	cii
Repairs.....	

J.

Jeddore.....	xvii
Jerseysmans Island.....	xviii
Jerome Point.....	xviii
Jig Rock Can Buoy.....	xxi

K.

Kagawong,.....	viii
Kelp Reef,.....	xxxiv
Repairs.....	
Beacon.....	

L.

Lighthouse Service.....	i
Limekiln Crossing,.....	v
Lake St. Louis Light-ships,.....	vi
Lancaster Bar,.....	vii
Lindoe Island,.....	ix
Lower Traverse Light-ship,.....	xiv
Light-ships,.....	xv
Low Point.....	xviii
Lower Fox Island Light,.....	xxiv
Letete Fog-alarm,.....	xxv
"Lansdowne".....	xxix xxxvii
Lighthouses,.....	xl
Longitude of Montreal.....	cxii
Live Stock,.....	cxix
Legislation.....	cxx
Light vessels.....	
Repairs.....	
do.....	
do.....	
do.....	
Quebec.....	
Repairs.....	
do.....	
Cost of maintaining.....	
Inspection of shipments.....	

M.

Middle Island.....	vii
Mississauga,.....	viii
Metis,.....	xiv
Meagher's Beach.....	xvii
Marjories Isle.....	xviii
Merigomishe.....	xix
Mullins Point.....	xix
Mars Rock.....	xxii
Musquash,.....	xxiv
Miramichi Light-ship,.....	xxv
Machias Seal Island,.....	xxv
Repairs.....	
do.....	
do.....	

M—Concluded.

		PAGE
Midjic Bluff,	Repairs.....	xxv
Miscou Island,	do	xxv
Musquash Island,	do	xxvi
Marks Point,	do	xxvi
Masters and Mates,	Certificates sea-going.....	xli
do do	do Inland and Coasting.....	xli
do do	Statement.....	xlii
do do	Certificates why necessary.....	xliii
do do	Statement of sea-going from 1871 to 1893.....	xlvi
do do	do competency coasting, Inland and Minor Inland and where issued.....	xlvi
do do	do of service coasting, Inland and Minor Inland and where issued.....	xcv
do do	Recapitulation.....	xcviii
do do	Statement sea-going service.....	cii
Merchant Shipping.....	Comparative statement.....	cvi
do do	New vessels.....	cxix
do do		cxix
Meteorological Service.....		cxvii
Magnetic Observatories.....		cxvii
Messenger Pigeons.....		cxix

N.

Nine Mile Point Fog-horn.....		iii
Nigger Island Light.....		iv
Nova Scotia,	Lighthouses.....	xvi
do	New lights.....	xvi
Neverfail.....		xxii
New Brunswick Lighthouse Division.....		xxiii
No Mans Friend,	Repairs.....	xxvi
Neguac,	do	xxvi
North-west Ledge Buoy.....		xxix
Nanaimo Harbour Lights.....		xxxiv
" Newfield ".....		xxxvi

O.

Ontario Lighthouse Division.....		ii
Oakville,	Repairs.....	vii
Orleans,	Range light.....	xiv
Orpheus,		xxii
Oromocto,	Repairs.....	xxviii
Old Man,	Buoy.....	xxix
Oil,	For lighthouses.....	xxxv
Obstructions to navigation.....		cxviii

P.

Parry Sound,	Range lights.....	iii
Pancake Shoal,	Bell buoy.....	vi
Pointe Clair,	Repairs.....	vi
Pointe aux Anglais,	do	vi
Point Peter,	do	vii
Port Dalhousie,	do	vii
Presqu'Île,	do	ix
Paspébiac,	do	xiv
Pillar's Lighthouse and Tower	do	xiv
Platon,	do	xiv
Pointe des Monts	do	xiv
Portneuf (below)	do	xv
Popes Island,		xvii
Point Tupper,		xviii
Point Aconi,		xviii
Pipers Cove,		xviii
Port Hood,		xix
Pomquet Island,		xix
Pictou Island,		xix

INDEX.

xi

P—Concluded.

	PAGE
Pictou,	xix
Port Medway,	xx
Pubnico,	xxi
Parrsboro,	xxi
Partridge Island, Repairs.....	xxvi
Pokemouche, do	xxvi
Point Lepreaux, do	xxvi
Pokesudie, do	xxvi
Partridge Island, Bell buoy.....	xxviii
Prince Edward Island, Lighthouse Division.....	xxx
Panmuir Island,	xxxi
Point Atkinson,	xxxiii

Q.

Quebec Lighthouse Division.....	ix
do Range lights.....	xi
Quaco, Repairs.....	xxvii
do Buoy.....	xxix
Quadra,	xxxviii

R.

Red Island Lightship, Repairs.....	xv
Repentigny do	xv
Richibucto, do	xxvii
do Beacon do	xxvii
Race Rock,	xxxiii

S.

Surprise Shoal Bell Buoy,	vi
St. Anicet Bar, Repairs.....	vi
Salmon Point, do	vii
Saugeen, do	viii
Serpent Reef,	xii
South Point, Anticosti, Repairs.....	xii
South-west Point Anticosti, do	xii
Seven Islands, do	xv
Spar buoys (Quebec),	xv
Sand Point,	xvi
St. Esprit,	xviii
Sydney Harbour,	xviii
Sand Point, Shelburne Harbour.....	xx
Seal Island,	xxi
St. Anns,	xxii
Sable Island,	xxii
Spare Automatic Buoys,	xxiii
St. John's Ledge,	xxiii
St. John Harbour Beacon Lights. Repairs.....	xxiii
St. Andrews Outer Light,	xxvi
Swallow Tail, Repairs.....	xxvii
Shediac Island, do	xxvii
South-west Head, Grand Manan, Repairs.....	xxvii
Sandy Island,	xxx
St. Peters, Harbour,	xxxi
Souris,	xxxi
St. Peters Island,	xxxi
Saturna Island,	xxxiii
Sand Heads,	xxxiii
Sturgeon Bank Beacons,	xxxiv
"Stanley",	xxxvii
"Sir James Douglas",	xxxix
Sick and Distressed Mariners,	xcviii
do do Expenditure.....	cii
Steamboat Inspection,	cxiii
Signal Service,	cxix

T.

	PAGE
Tor Bay,	xvii
Three Top Island,	xvii
Thrum Cap,	xxii
Tancook Island,	xxii
Tracadie (South),	xxvii
Tracadie North Range Light,	xxvii
Tignish Run,	xxx

W.

Whisky Island,	Repairs	viii
West Point, Anticosti,	do	xii
White Island, Reef Lightship,	do	xiv
Wedge Island, .....	.....	xvii
White Head, .....	.....	xvii
West Ironbound, .....	.....	xx
West Isles Buoys, .....	.....	xxix
Wood Island, .....	.....	xxxi
Wrecks and Casualties, .....	.....	xlii

Y.

Yarmouth Harbour,	xxi
-------------------------	-----

APPENDICES.

E.

Expenditure,	Statement of	1
--------------------	--------------------	---

H.

Hydrographic Work,	Chief Engineer's Report	28
do do	Survey of Tides and Currents, Report of W. B. Dawson,	29
do do	Georgian Bay Report of W. J. Stewart	42

L.

Live Stock Shipments,	Record of shipped from Port of Montreal	62
Life Boat Stations,	Statement of	76
do do	Report on Efficiency by Alfred Ogden,	78
do	Extract from Paper by Sumner J. Kimball, Supt. of United States Service	80
Legislation, .....	.....	84
Lighthouses,	Comparative Statement in each Province and Agencies	87

M.

Meteorological Service .....	.....	3
do do	Storm Signal Service,	4
do do	Weather Forecasts,	5
do do	Predictions,	6
do do	Inspectors' Reports	9
Magnetic Observatory .....	.....	17
do do	Time Service	17
do do	Tidal do	18
do do	Quebec Observatory,	23
do do	St. John do	24
do do	McGill College	25
Masters and Mates,	Report of Chairman of Board of Examiners	50
Messenger Pigeon Service,	Report of L. J. Dopping Hepenstal	73
do do	do of D. Mills	74

INDEX.

xiii

R.

	PAGE
Revenue, Statement of.....	2
Rewards for Life Saving	88

S.

Storm Signal Service.....	4
Steam-boat Inspection, Chairman's Report.....	45
do do Maritime Provinces Division.....	47
do do Manitoba and North-west Division.....	47
do do British Columbia Division.....	47
do do Penalties.....	49
Signal Service, Report of H. J. McHugh.....	53
do do Telegraph and Semaphore Service.....	60
Sick Mariners Dues, Statement of.....	91

W.

Wharfs, Statement relating to.....	70
------------------------------------	----

REPORT OF THE DEPUTY MINISTER.

To the Honourable

SIR CHARLES HIBBERT TUPPER, K.C.M.G.,
Minister of Marine and Fisheries.

SIR,—I have the honour to report on the transactions of the Marine Branch of this department for the fiscal year ended 30th June last, and to give an account of a portion of the business up to date.

In appendices to this report will be found returns from the Chairman of the Boards of Steamboat Inspection and Examiners of Masters and Mates; the reports of the Toronto, Belleville, Montreal, Quebec, Three Rivers, Pictou and North Sydney Harbour Commissioners, the Pilotage Authorities, the Harbour Masters and Port Wardens, together with a statement of wrecks and casualties.

The total amount expended on the various branches of the Public Service during the fiscal year ended 30th June last was \$842,242.82. The salaries of the established staff, including Marine and Fisheries, amounted to \$45,801.02.

The total amount voted by Parliament was \$881,532.18, not including the departmental salaries. It will thus be seen that during the fiscal year the expenditure was \$39,289.90 less than the amount appropriated by Parliament.

The whole number of persons in the outside service of the Marine Branch at the date of the report is 1,536.

During the past fiscal year the expenditure for maintenance of Lighthouse and Coast Service amounted to \$475,885.45, and for construction of lights, \$27,474.80; total for maintenance and construction, \$503,360.25, while for the previous year the expenditure for Lighthouse and Coast Service, including construction, was \$485,988.78, showing an increase of expenditure for the year ending 30th June last of \$17,371.47. The appropriation for this service was \$525,235.00; the expenditure being \$21,874.75 less than the appropriation of Parliament for the fiscal year.

LIGHTHOUSE SERVICE.

The lighthouse service of the Dominion is divided as follows:—The Ontario division, embracing all lights from Montreal westward to the North-west Territories; the Quebec division, extending below Montreal and including the River and Gulf of St. Lawrence and the Strait of Belle Isle; the Nova Scotia division, including St. Paul's Island, Cape Breton, Sable Island and Cape Race, Newfoundland; the New Brunswick division, the Prince Edward Island division, and the British Columbia division, each including the lights within the Provincial boundaries. The total number of light stations, light-ships and fog-alarm stations in the Dominion on the 30th June, 1893, was 619, and of lights shown, 749; the number of steam-whistles and fog-horns, 58; the number of light-keepers and engineers of fog-alarms with masters of lightships was 624.

The following is the number of lights shown, of fog-whistles and fog-horns in the Dominion on the 31st of December of each year, from 1868 to date, inclusive.

These numbers include the light stations on the coast of Newfoundland, maintained by the Dominion.

	Light Stations.	Light- houses.	Fog- whistles.	Fog-horns.
31st December, 1868.	198	227	2	....
do 1869.	219	233	2	....
do 1870.	240	278	4	....
do 1871.	264	297	8	....
do 1872.	280	314	13	....
do 1873.	316	363	17	....
do 1874.	342	384	18	....
do 1875.	377	444	22	....
do 1876.	407	488	24	....
do 1877.	416	509	25	2
do 1878.	427	518	25	4
do 1879.	443	542	23	6
do 1880.	452	551	22	7
do 1881.	462	553	23	9
do 1882.	470	562	23	9
do 1883.	484	578	23	9
do 1884.	507	597	23	10
do 1885.	526	617	23	12
do 1886.	534	625	23	16
do 1887.	561	658	23	24
do 1888.	569	664	23	27
do 1889.	579	675	24	29
do 1890.	599	706	23	32
do 1891.	606	710	23	31
do 1892.	617	741	23	34
1st do 1893.	619	749	24	34

ONTARIO LIGHTHOUSE DIVISION.

This division includes the lighthouses and light-ships in that part of the province of Quebec lying west of Montreal, all the lights in the province of Ontario, embracing the lights on the Ottawa River, the St. Lawrence River above Montreal, the great lakes, and some of the smaller inland lakes, as well as a lighthouse and light-ship on Lake Winnipeg, in the province of Manitoba.

The number of lighthouses, lighted-beacons and light-ships maintained by the Dominion in the Ontario division, inclusive of the two in Manitoba, is 221, located at 178 different stations.

The number of light-keepers in this division, paid directly by the Government, is 169, but in several cases assistants are employed by keepers and paid by them out of the allowance made by the Government for that purpose.

There are also in Ontario two fog-whistles, six fog-horns and three fog-bells, all located at light stations, as well as four bell-buoys.

Besides the lights maintained by this department, as above described, there are in Ontario the following aids to navigation: two lights on swing-bridges, maintained by the owners of the bridges; a system of lights on the Murray Canal, maintained by the Department of Railways and Canals; four pairs of range lights on the Detroit and St. Clair rivers, maintained by the American vessel owners principally interested; and twelve wharf lights, maintained by the municipalities or corporations to which the wharves belong. Six of these last described stations are aided by this Department to the extent of being furnished with the necessary oil for their maintenance.

The lights in this division, with the exception of those on the Bay of Quinté, the Ottawa River and the small lakes, were inspected during the months of July and August by Mr. Patrick Harty, Superintendent of Lights, and supplied with the necessary stores for annual maintenance.

In the month of October Mr. Harty inspected all the Ottawa River lights.

NEW AIDS TO NAVIGATION.

Fog-horn at Nine Mile Point, Lake Ontario.

In accordance with the decision arrived at, as indicated in last year's report, plans and specifications were prepared and tenders invited for the erection of a steam fog-horn building, at Nine Mile Point light station to replace the pole at present in use.

A contract was awarded to Mr. William Ashe, of Ottawa, who has erected the building for \$1,500, and has fitted up in it two boilers and fog-horn machines, supplied under contract by Messrs. Carrière, Laine & Company of Lévis, Quebec: the total expenditure in connection with the establishment of the fog-alarm being \$3,733.33.

Arrangements have been made to put this fog-alarm in operation in the spring of 1894.

The horn will give blasts of 8 seconds' duration with intervals of 22 seconds between them.

The fog-horn building stands immediately to the north-west of the lighthouse tower. It is square in plan, of wood, painted white with a brown roof. The horns point out to the south-west and are elevated 16 feet above the level of the lake. The machinery and boilers are in duplicate throughout so that in the event of one becoming inoperative the other may be put in operation and the alarm continued without interruption.

Parry Sound Range lights.

The range lights in the approaches to Parry Sound referred to in last year's report, have been built, but have not yet been accepted by the department.

A contract was entered into by Mr. Charles Mickler, of Collingwood, to erect the five buildings for \$3,165, and he proceeded with the work, but the reports received from the local inspector were so unsatisfactory that Mr. C. F. Cox, Assistant Engineer, was sent from Ottawa to make a special investigation. He reported so many defects that the department refused to take the buildings off the contractor's hands or to make any advance on them until the work and materials were made satisfactory. In the meantime, navigation having closed, it has become impossible to make the necessary alterations until next spring, and consequently the lights cannot be put in operation until some time after the opening of navigation.

Light on Giants Tomb.

The lighthouse on Giants Tomb Island, in the Georgian Bay, which was in course of construction when the last annual report was prepared, has been completed, and was put in operation on the opening of navigation last spring. The light is fixed white, elevated 400 feet above the level of the bay, and should be visible 11 miles from all points of approach by water.

The illuminating apparatus is dioptric of the 7th order. The lighthouse stands on the boulder and gravel beach at the southern extremity of the island, close to the water. It consists of a small wooden tower with dwelling attached painted white, the tower surmounted by an iron lantern painted red.

The height of the building from its base to the vane on the lantern is 37 feet.

The total expenditure in connection with the establishment of this light has been \$2,177.35.

Nigger Island light to replace Potter's Island light.

During the past season a complete hydrographic survey of the Bay of Quinté has been made, and the results of this survey show that the temporary light established last year on Potter's Island was not in the best position for leading through the narrow and critical channel between Nigger Island and Potter's Island. The Chief Engineer having reported that a light at this point should be built on a pier on a shoal south-west of Nigger Island, plans and specifications have been prepared and a contract has been entered into for the completion of the work by the opening of navigation next year. Mr. Wm. J. Gates, of Kingston, who submitted the lowest tender, has been awarded the contract at \$2,000.

Improvements in the light approaching French River.

In 1875 an officer of the department acting in conjunction with an officer of the department of Public Works made a survey of the mouth of French River and established four temporary lighthouses to guide vessels from the Georgian Bay to the landing place in the river, which have since been maintained by this department.

When Staff Commander Boulton surveyed that part of the Georgian Bay he reported certain changes and improvements in the arrangement of these lights desirable, and during the past year these recommendations have been carried into effect, as follows:

(1) Bustard Rocks main light.

The main lighthouse on the Bustard Rocks, which in addition to being a range light, is also used as a lake coast light, has been replaced by a new tower built 20 feet north-east $\frac{1}{4}$ east from the old one.

The new building is a square wooden tower, painted white, surmounted by a hexagonal iron lantern painted red. The height of the tower from its base to the vane on the lantern is 37 feet.

The light is as heretofore fixed white. It is elevated 48 feet above the level of the bay, and should be visible 12 miles from all points of approach, except over the dangerous rocks and shoals to the north-eastward and eastward. The illuminating apparatus is dioptric of the 7th order.

2.—Bustard Rocks, front light of inner range.

The front range lighthouse on the Bustard rocks, has been replaced by a new tower built near the site of the old one, 229 feet N.E. $\frac{1}{4}$ E. from the main light building.

It is a square wooden tower, painted white, surmounted by a square wooden lantern, painted red, and is 28 feet high from its base to the vane on the lantern.

The light is as heretofore fixed white, catoptric, elevated 39 feet above the water, and is visible six miles in, and over a small arc on each side of the line of range.

The above described two lights in range lead in, from a point just clear of the north Bustard Rock, to the intersection of this range with the French River range.

(3)—*Bustard Rocks, front light of outer range (new light).*

An additional range lighthouse has been erected on the Bustard Rocks, 193 feet W. by S. from the main tower.

The building is a square wooden tower painted white, surmounted by a square wooden lantern, painted red, and is 28 feet high from the base to the vane on the lantern.

The light which was put in operation on the 16th October last, is fixed white, catoptric, elevated 27 feet above the level of the bay, and should be visible 10 miles in and over a small arc on each side of the line of range.

This light, in one with the light in the main tower, leads in E. by N. from deep water clear of Isabel Rock on the north, and of all the shoals south-west of Bustard Rocks on the south.

(4)—*French River back range light.*

The back range tower of the French River range has been replaced by a new tower built in the village 340 feet back, or N. E. by N., from the old tower. This change of site was found to be desirable because the tower in its former position was hidden by lumber piles and consequently could not be utilized as a day beacon.

The new tower is a square wooden building, painted white, surmounted by a square wooden lantern painted red, and is 33 feet high from its base to the vane on the lantern.

The light is, as heretofore, fixed red, catoptric, and should be visible six miles in and over a small arc on each side of the line of range. It is elevated 37 feet above the level of the bay.

The French River range leads in, as heretofore, from its intersection with the inner Bustard range to Lefroy Island, clear of all obstructions.

Limekiln Crossing light-vessels.

For many years past the Government of the United States of America has been occupied in cutting a channel through the rock bottom of the Detroit River, at the Limekiln Crossing above Amherstburg, Ontario. As this channel is useful principally to heavy draught American vessels, the whole expense of the work has been borne by the American Government, although most, if not all of the work has been in Canadian waters.

During the past season an application was made by the American Lighthouse Board for permission to maintain two light-vessels in Canadian waters to mark this crossing, and an Order in Council having issued giving the desired permission, the vessels were established on the 15th September last. They are flat bottom scows with trunk cabins. The hulls are white, marked with red letters on each side respectively,—“Limekiln Crossing (South)” and “Limekiln Crossing (North).” Each vessel shows one fixed white light from a lens lantern suspended 19 feet above

the water from a crane on an upright rising 3 feet above a tripod. During thick or foggy weather a bell is struck by hand.

Surprise Shoal bell buoy.

A bell buoy was moored in October last, on Surprise Shoal off Cape Croker, in the Georgian Bay. This buoy was made by the Hamilton Bridge Company, their contract price being \$600.

The work of attending to this buoy was let by contract; the tender of Captain Scott, \$175 per annum for a period of three years, being the lowest, was accepted.

Pancake Shoal bell buoy.

A similar buoy has been completed by the same company at the same price, for Pancake Shoal, at the east end of Lake Superior. The buoy was not placed this season as no tenders were received for its maintenance, but arrangements will be made to have it put in position on the opening of navigation next year.

PRINCIPAL REPAIRS AT EXISTING STATIONS.

Pointe Claire.

Twenty-five cords of riprap were placed in front of the new pier for further protection against ice shoves, at a cost of \$131.15.

Pointe aux Anglais.

As indicated in last year's report a contract for a new pier at Pointe aux Anglais light station was let to Mr. Richard Abbott, of Ottawa, last year. Mr. Abbott proceeded with the work until the close of navigation, but was not satisfied with the department's rulings with regard to the amount of work to be done and refused to complete it. The work was consequently completed by the department under the direction of Mr. W. H. Noble, foreman of works, the cost of completion, \$892.47, being deducted from the contract price, \$1,775. At the same time some repairs were made to the lighthouse tower not included in Mr. Abbott's contract at a cost of \$372.49. The total expenditure on this work has been \$2,147.49.

Lake St. Louis light-ships.

The three light-ships have been maintained as usual during the past season, As it was desirable to scrape and paint their bottoms this winter, a contract was let to Mr. Louis Metras, of Lachine, to remove them from the water, and they are now wintering on the canal bank at Lachine.

Beauharnois.

Repairs were made to the foundations of both the range light towers under the direction of the lightkeeper at a cost of \$38.95.

St. Anicet Bar.

One hundred cords of riprap stone were placed around the pier during last winter at a cost of \$297.25.

Lancaster Bar.

The foundation of the lighthouse on the pier at this station was repaired, the roof of the dwelling re-shingled and other small repairs made at a cost of \$19.75.

Point Peter.

A new clockwork machine was supplied to revolve the illuminating apparatus at a cost of \$494.90.

Salmon Point.

New sills and a new foundation were put under the barn at this station at a cost of \$35.

Oakville.

In consequence of damage done by storm to the outer end of the east pier at Oakville, Ontario, the lighthouse tower which stands upon it was moved 60 feet inwards from its former position, and now stands 80 feet from the end of the pier. The cost of removal was \$62.62.

Port Dalhousie.

The main light at this station which was built upon a cribwork block attached to the east breakwater was found to be settling in consequence of the rotting away of the timber work of the block; it was therefore decided to place it upon a new foundation, and Mr. W. H. Noble, foreman of works, was sent to carry out the work, which could be done more profitably by days' labour than under contract.

The new foundation prepared was a circular steel casing filled with concrete masonry. When preparations were made to erect the old tower on a new foundation, it also was found to be in such a bad condition that it was thought preferable to erect a new tower, which was accordingly done, the old lantern and illuminating apparatus being utilized on the new building. The total expenditure in connection with this work was \$2,157.71.

Middle Island.

The Chief Engineer was sent to this station to investigate into the dispute as to the settlement for repairs made last year. He having reported that the work was efficiently done and that the prices were reasonable, the work having been undertaken in consequence of a misunderstanding of the instructions given to the keeper, payment was made, the contract price being \$200.

Colchester Reef.

The cribwork containing stone ballast to protect the lighthouse foundation was damaged by a storm which also carried away the boat derricks. The pier was repaired and the boat derricks replaced, and some other repairs made at the station at a cost of \$309.87.

Corunna.

Reference was made in last year's report to the destruction by fire of the back range tower at this station, and of a contract having been let to replace it. This

contract has been satisfactorily completed and the old tower replaced by a new one on the same site. This is an inclosed wooden tower, square in plan, painted white, 42 feet high from the ground to the top of the lantern.

The light will be elevated 67 feet above the level of the river.

The work was done under contract by Mr. James Adair of Courtright for \$205.

The front tower, which was formerly an open frame building has been enclosed from top to bottom. Improved catoptric apparatus has been placed in both towers.

Goderich.

Repairs were made by the keeper to the shed attached to the tower at a cost of \$54.25.

Saugeen.

On the opening of navigation last spring, the fishing light on the breakwater on the north side of the mouth of Saugeen River, in the west riding of Bruce, Ontario, was changed from fixed green to fixed white, and improved by substituting a Chance's anchor light dioptric lantern of the 7th order for the small pressed lens lantern previously used.

The white light should now be visible 10 miles from all points of approach from the lake.

In other respects the station is unchanged.

Cove Island.

General repairs were made to the dwelling-house and shed attached under the keeper's directions, at a cost of \$31.75

Christian Island.

The chimney of the dwelling-house was rebuilt at a cost of \$40.

Whiskey Island.

The tower at this station was struck by lightning during the past season and the expense involved in repairing the damage was \$38.

Mississauga Strait.

A new pony pump has been supplied at a cost of \$125.

Fort William.

The foundation of the dwelling-house at this station was repaired under the directions of the late keeper, at a cost of \$50.

Kagawong.

As indicated in last year's annual report tenders were invited for the erection of a small tower to replace the mast and shed burnt down at Kagawong, but the tenders received were so high that it was considered preferable to postpone erecting a building until a foreman could be sent from the department to superintend its con-

struction and put up the building by days' labour. In the meantime a temporary light from a pole is being maintained.

Lindoe Island.

General repairs were made to the dwelling at a cost of \$41.50.

Presqu'Île.

The lighthouse at the extremity of Presqu'Île, in Lake Ontario, is a high octagonal stone building erected in 1840. In consequence of bad stone and workmanship having been used the tower cracked badly and became unsafe. It has been repaired by surrounding it with iron bands and planking and shingling the side over the stonework so as to prevent the entry of water or frost.

The dwelling-house at this station was found to be unhealthy, and not having been occupied for some years was in bad condition. The cellar excavated was below the ordinary level of the lake and was consequently never dry. Extensive repairs to this building are in progress and will be completed after the opening of navigation next year. They include filling up the cellar to the ground level, lining the stone building with ceiling boards, raising the ceiling and increasing the height of the upper story. The expenditure to date on the repairs to the tower and dwelling has been \$1,096. It is estimated that it will take \$404 to complete the work.

QUEBEC LIGHTHOUSE DIVISION.

This division comprises all the lighthouses, and light-ships below Montreal, on the St. Lawrence and Richelieu rivers, and Lake Memphremagog; all the lighthouses, lightships, steam fog-alarms, fog-guns, iron and wooden buoys, beacons, &c., &c., below Quebec, in the River and Gulf St. Lawrence, Straits of Belle Isle, north-west coast of Newfoundland, Labrador and north side of Baie des Chaleurs, &c., &c.

This division is under the control of Mr. J. U. Gregory, agent of the department at Quebec, who also has under his superintendence, for the purpose of maintaining the efficiency of this extensive and important district, the Dominion steamer "Alert," which is engaged in carrying out the increasing demands of the different services, with such aid, as can be furnished by the steamer "La Canadienne," or by steamers engaged from time to time.

Besides performing the duties of agent of the Department of Marine and Fisheries, Mr. Gregory is also shipping master, and attends to the requirements of the British Board of Trade in connection with the distressed seamen, shipwrecks, casualties at seas, and receiver of wrecks.

His staff consists of Mr. L. A. Blanchet, accountant, and deputy shipping master; Messrs. Geo. O'Farrell and Alph. Hamel, clerks; N. FitzHenry, store-keeper and wharfinger; Mr. O'Farrell, for the past year, has been acting-inspector of lights, assisted by Mr. P. Jobin, master-carpenter, and Mr. J. Rolph, chief engineer of the steamer "Alert," for the lights below Quebec in the River St. Lawrence.

Captain Demers has inspected all lights, above Quebec; besides attending to the maintenance of the large buoy system, in this agency. The workshops are under the control of C. Vezina, master shipsmith, and P. Jobin, master carpenter.

The lights between Quebec and Montreal were supplied by arrangements similar to last year. In the spring of 1893, the supplies were placed on board market boats and were landed at the wharves nearest the light-stations. Captain Demers had the supplies under his control, and by his directions they were conveyed to the place required at the same time he visited the lighthouses for the purpose of inspection.

The gas buoys of which there are 10, were placed in position and maintained by the "Alert," and by tug boats specially employed at times when the "Alert" was not available.

There are in this division 152 lights at 115 stations, 8 light-ships, 3 of which are supplied with steam fog-whistles; 7 fog-guns, 2 explosive bomb stations, 2 fog-whistles and 8 steam fog-horns at light-stations; 10 gas buoys, 4 of which are supplied with bells, and 59 beacons.

The steamer "Alert" supplied all the lights in the lower part of the River St. Lawrence, the Gulf, Bay des Chaleurs, Anticosti, Strait of Belle-Isle, Labrador and north-west coast of Newfoundland.

IMPROVEMENT IN AIDS TO NAVIGATION.

In compliance with the desire of a large number of pilots, masters, ship owners and agents, the gas buoy heretofore maintained off the north-east extremity of White Island Reef in the River St. Lawrence below Quebec, was replaced by the light-ship previously stationed off Manicouagan Shoal, and the maintenance of a light-vessel at the latter place has been abandoned. The light-ship is moored in 8 fathoms of water, is painted red with the words "White Island Reef" in red on each topside and shows a fixed red light from each mast; the light on the foremast is elevated 24 feet, that on the main mast 27 feet above the water. Each light should be visible 10 miles from all points of approach.

A steam fog-whistle on the vessel sounds a blast of 8 seconds' duration followed by a silent interval of 8 seconds, then another blast of 8 seconds' duration, followed by a silent interval of 2 minutes and 20 seconds.

The removal of this light-ship from Manicouagan was not made without carefully weighing the consequences of the change. It was recognized that a useful aid to navigation would be abandoned, but the importance of the Manicouagan light-ship has decreased very much in consequence of the great substitution of steam-power for sailing vessels in the River St. Lawrence traffic, and the majority of the steamers keep from the north shore, while every vessel using the river will utilize the light-ship in her new position; moreover, the change in position is part of a scheme to light the channel north of Hare Island, which is much more suitable for the navigation of heavy steamships than the channel south of that island. The Chief Engineer of the Department visited the district last spring and suggested the establishment of a gas buoy on the Middle Ground, of a strong coast light and fog-alarm on Cape Salmon, which, together with the establishment of the White Island Reef light-ship above described, should make the north channel safe for navigation in the darkest and thickest weather.

The attention of masters and pilots of steamers is invited to the superior facilities for navigation which this channel affords. The only drawback to its use by sailing vessels is the want of good anchorage.

Cape Salmon.

As above indicated it is proposed to erect a lighthouse and fog-alarm building on La Pointe de Roches, immediately to the eastward of Cape Salmon. A contract was awarded for the necessary buildings to Mr. Jean Warren, of Murray Bay, whose tender, \$3,700, was the lowest, and the work will be proceeded with on the opening of navigation.

In connection with the above scheme of lighting the channel north of Hare Island, the red can buoy previously maintained on the north-east extremity of the Middle Ground between St. Roch des Aulnets and Coudres Island, near the east end of the South Traverse, was on the 1st July last replaced by an iron spherical buoy painted red, with "Middle Ground" in white letters, surmounted by a lens lantern showing a bright or white gas light occulted about every 6 seconds. This light is elevated about 10 feet above the water, and should be visible 8 miles, but must not be depended on too much as it is liable to be extinguished by collision or stress of weather.

Quebec Range Lights.

A range of lights established by the Quebec Harbour Commissioners in 1891 to guide vessels to the Commissioners' Wharf, in Quebec Harbour, has been assumed, and will hereafter be maintained, by the Government.

The front light stands upon the north-east corner of the Princess Louise Basin Embankment, near the Immigration Offices. It is fixed red, elevated 43 feet above high water mark, and should be visible 8 miles from all points of approach by water.

The illuminating apparatus consists of an electric arc light shaded by a red globe, attached to an arm on a mast, which rises out of the centre of a small square tower painted brown. The height of the top of the tower above the wharf is 17 feet, and of the top of the mast, 40 feet.

The back lights are located on the Battery at the foot of Ste. Famille Street, 2,900 feet W. S. W. from the front light. They consist of two fixed red lights 16 feet apart vertically, the upper one 112, the lower one 96, feet above high water mark. They are also electric lights, shaded by red lenses. The upper one is an arc light, and the lower one an incandescent light. They should be visible 8 miles in, and over a small arc on each side of, the line of range.

The higher lamp is hung from an arm on a post 47 feet above the ground, the lower one from an arm on a post 31 feet above the ground.

Change in Beaujeu Bank Gas Buoy.

In consequence of the large pillar gas and bell buoy being no longer required on White Island Reef, it was utilized to replace the smaller spherical gas buoy at the west end of Beaujeu Bank, this latter buoy being utilized for the new position on the Middle Ground above described. The change was carried into effect on the first July last.

The new buoy on Beaujeu is painted white like the old one, with "Beaujeu Bank" in black letters, and is surmounted by a bell and by an occulting white gas light at an elevation of 14 feet above the water.

Serpent Reef.

A buoy was placed in September last to mark Serpent Reef, in the Gulf of St. Lawrence, off the coast of the county of Gaspé, being the locality where the sa. "Hurona" stranded. The buoy is a wooden can buoy 6 feet in diameter, painted black, moored in 6 fathoms water about one mile from shore, and $7\frac{1}{4}$ miles south-east by south from Fame Point lighthouse. The water 250 feet inside the buoy is only 12 feet deep, and although there is a 7-fathom channel farther in, it is crooked and not considered safe. All vessels should therefore keep outside of the buoy.

PRINCIPAL REPAIRS TO EXISTING STATIONS.

Algernon Rock.

The pier here was considerably injured by ice and required repairs to timbers and sheathing with boiler-plates. Some repairs to the tower were also required. The work was carried out by the keeper with local assistance at a cost of \$273.31.

Anticosti, Heath Point.

Buildings were reshingled and repairs to tower work was performed by two carpenters sent down from Quebec under superintendence of Mr. Pierre Jobin, foreman, at a cost of \$77.55.

Anticosti, South Point.

Repairs to dwelling and outbuildings, reshingling, covering lantern, new windows, floor painting, carried out by the two men who did the work at Heath Point. Cost, \$261.66.

Anticosti, South-west Point.

Materials and shingles for sundry repairs were sent down. Keeper did the work. Cost, \$37.25.

West Point, Anticosti.

Tower, dwelling and outbuildings and boat were repaired and painted by the two workmen above referred to, at a cost of \$226.19.

Ash and Bloody Island.

The pier at Bloody Island damaged by ice was repaired by the keeper and help at a cost of \$10.60.

Batiscan Tower.

The foundation required to be filled under with sand owing to frost causing upheaval. The tower was painted, lantern re-covered; work performed by keeper and assistance allowed. Cost, \$74.94.

Bird Rocks.

The boiler, tanks and hoisting apparatus were repaired in agency's work-shops at a cost of \$74.70.

Cap aux Oies.

The gallery, railing and buildings required repairs and reshingling. This work was done by the keeper, who hired the necessary assistance, at a cost of \$33.40.

Cap Chatte.

New shed and repairs to buildings were necessary. The shed is required to protect operator when firing gun cotton fog-signals. The work was performed by the keeper and assistance allowed. Cost, \$80.70.

Cape Magdalen (Above Quebec).

Repairs to the back tower of the upper range consisting of covering lantern, repairs to floors, steps, foundation and painting both towers two coats was done by Mr. François Desruisseaux from Quebec, at a cost of \$108.02.

Cape Norman.

The buildings required clapboarding, replastering and shingling and considerable general repairs, including painting. The work was done by two men, sent down from Quebec under supervision of Mr. P. Jobin, master carpenter. Cost, \$518.70.

Cape Ray.

The buildings required reshingling, plastering and small repairs, which was performed by a workman sent down from Quebec, under supervision of Mr. Pierre Jobin. Cost, \$187.75.

Cape Rosier.

Considerable repairs to tower, dwellings, and outbuildings, consisting of new stairs, covering cistern, plastering, flooring, clapboarding tower and done by two workmen sent from Quebec, under supervision of Mr. Pierre Jobin. Cost, \$516.69.

Contrecoeur.

Repairs to the foundation of the large tower where necessary; offers from parties in the locality were made to do this work for \$300. Authority was obtained from the department to send up a foreman from Quebec, using local help to do necessary work. This was performed by M. P. Desruisseaux, with assistance, and cost \$32.42.

Crane Island.

A new well was required at this station on account of the unwholesome condition of the water; this was allowed with pumps and pipes to cost \$33, and repairing buildings \$40. The work was performed by local workmen under supervision of lighthouse-keeper.

Etang du Nord.

Repairs to rooms, flooring, cupboard, tank bench were made and whitewashing was done with local assistance, at a cost of \$57.90.

Father Point.

Lantern recovered, new flooring and repairs to house and painting. The work was performed by keeper with local assistance, at a cost \$126.10.

Green Island.

The buildings at this station are the oldest in the district and frequently require small repairs. During this season the cost of such repairs performed by keeper with local assistance, amounted to \$62.70.

Lower Traverse Light-ship.

A new deck was laid and repairs to hull and joiner work inside performed under supervision of Mr. P. Jobin and local assistance. Cost, \$1,288.89.

White Island Reef Light-ship.

Repairs to engine, boiler and fittings were performed by the engineer and assistant at the agency's forge. Cost, \$200.68.

Métis.

A new metal roof was put on the dwelling by the lowest tenderer Mr. J. R. Kane, roofer of Quebec, with other small repairs. Cost, \$156.07.

Orleans Range Light.

Two new masts with rigging to hoist dioptric lights were provided, the towers were levelled up and repairs to foundations required, owing to heaving of the soft soil were made by two workmen sent from Quebec. Cost, \$183.70.

Paspebiac.

The foundation of the tower required considerable repairs which were performed by the keeper and local assistants. Cost, \$58.

Pillars Lighthouse and Tower.

The dwelling-house which is old and in bad order is to be renewed. The repairs necessary to keep the station in working order, with repairs to boats allowed, were done by the keeper and local assistance at a cost of \$164.23.

Platon.

Repairs to tower and painting done by the keeper and assistance allowed. Cost \$15.

Pointe des Monts.

Repairs, clapboarding tower and general repairs to windows, floors, doors, roof, masonry and painting. Two men were sent from Quebec, who with local assistance did the work, under the supervision of Mr. Pierre Jobin, at a cost of \$187.20.

Portneuf (below).

Repairs and painting the tower and building. The work was done by keeper with local assistance. Cost, \$72.32.

Red Island Light-ship.

Repairs to engine, boiler and connections, work done by engineer and assistance. Cost, \$117.57.

Repentigny.

Repairs to foundation of tower and roof work was performed by two men sent up from Quebec. Cost, \$91.66.

Seven Islands.

Repairs to the kitchen and outbuildings were made by keeper and assistance. Cost, \$24.

LIGHT-SHIPS.

The Lower Traverse Light-ship was hauled up, scraped, painted and repaired, and deck renewed last winter. All the other light-ships are in good order and condition; but will require the ordinary small repairs and outfitting during winter.

The Manicouagan Light-ship and steam fog-whistle service was discontinued, and the light-ship moored on White Island Reef, being the entrance of the North Channel, now being extensively used by heavy draught ocean vessels.

GAS AND OTHER BUOYS, ABOVE AND BELOW QUEBEC.

The maintaining of the efficiency of this large and important district has been performed by the steamer "Alert," when not on duty on lighthouse service, in the Gulf, &c., and by engaging tug steamer adapted for carrying buoys and gas tanks, and with proper lifting gear.

The Lark Reef checkered buoy was altered to red buoy; the White Island Reef wooden can red buoy was discontinued. The wooden can red buoy at the east end of Middle Ground was replaced by the gas buoy. The Traverse wooden can wreck buoy, indicating a former wreck, was removed, not considered necessary any longer, owing to the wreck having disappeared.

Three new large can buoys, and eight spar buoys, were built this year, at a cost of \$776.65, including cost of chains, swivels, anchors, painting, &c.

Six beacons were built and repaired, at a cost of \$141.60; for this district.

Spar Buoys.

The spar buoys, placed in position below Quebec, after all the other buoys are removed, at the end of the season, have become so valuable to vessels, leaving at such a late period, that you have authorized me to renew them, every fall.

One is also placed at Ste. Croix, and one at Pointe aux Trembles, when the gas buoys, at these stations, are removed.

The sum of \$596.65 was spent on spar buoys, from the 1st July, 1892, to the 30th June, 1893.

NOVA SCOTIA LIGHTHOUSE DIVISION.

This division, in charge of Mr. H. W. Johnston, agent of the department for the province, includes the charge of 177 light stations exhibiting 190 lights, 1 light-vessel, 16 steam fog-alarms, 1 signal bomb station, 17 hand fog-alarms, 2 fog-bells, 14 automatic whisting buoys and 10 iron bell buoys on stations, 95 iron can buoys, about 700 spar and other small buoys, 8 stationary beacons, 15 life-boat stations, 3 humane establishments and 4 signal stations. The steamer "Newfield" is also under the control of this agency.

The lighthouses and fog-alarms throughout this division have been inspected by Mr. C. A. Hutchins, superintendent of lights, and the boilers and machinery at the fog-alarm stations have been examined by Mr. Warner and Mr. Devan, engineers of the "Newfield."

NEW LIGHTS.

Candlebox Island.

As indicated in last year's report the construction of a lighthouse on Candlebox Island at the western end of Schooner Passage, Bay of Fundy, was under taken by Mr. John B. Porter, of Belleville, N.S. He satisfactorily completed his contract, and the lighthouse was put in operation on the 1st of February last.

The light is fixed red, elevated 56 feet above high-water mark, and should be visible 8 miles from all points of approach.

The illuminating apparatus is dioptric of small size.

The lighthouse, which stands near the centre of the small island, consists of a square wooden tower with dwelling attached, painted white, the tower surmounted by an iron lantern painted red. The height of the lantern from its base to the vane of the lantern is 57 feet.

Bunker Island, Yarmouth.

During the past season the lighthouse on the end of the reef off the south-west point of Bunker Island, on the east side of the entrance to Yarmouth Harbour, has been removed to a new concrete pier built immediately south of the old cribwork pier, under the supervision of Mr. W. H. Noble, the old pier having become completely rotten. The cost of this change was \$5,461.97.

The new pier consists of a steel cylinder, 36 feet in diameter, filled with concrete, and carried up 4 feet higher than the old one. The height of the light above high water mark will consequently be 31 feet instead of 27 feet as in the past, and the light will be 27 feet south of its old position.

Sand Point or Eddy Point.

A new square tower attached to the old lighthouse building, is in course of construction at this station by Mr. T. M. Crowe, Truro, N. S., under contract for the sum of \$800. The two horizontal lights to be changed to one fixed light shown from the lantern on tower. It has been considered advisable thus to improve the efficiency of the light at this important station, it being the only guide to the large number of vessels passing through the Gut of Canso. It is hoped that this new light will be ready for the opening of navigation in 1894.

Gillis Point.

It has been decided to establish a light on Gillis Point in the Great Bras d'Or, and when established the light at the railway bridge will be discontinued, as the bridge lights will suffice to guide to the swing.

In connection with the establishment of this light delay has occurred in consequence of the necessity which arose from expropriating this land, but plans have now been prepared and tenders will be immediately invited for a combined light-house tower and dwelling.

The following repairs and improvements have been made at various stations, in addition to the usual care and painting of the building.

Meagher's Beach.

The seaward face of breakwater repaired and an additional groin built. Twenty feet of groin on southern side carried away last winter has been replaced.

Devil's Island.

A wire fence inclosing the west end light and keeper's dwelling has been erected.

Jeddore.

A wooden tank six feet square has been constructed in cellar to hold rain water.

Pope's Harbour.

New spouts fitted to dwelling, kitchen pump and clock furnished.

Wedge Island.

Leaks in roof repaired.

Country Harbour.

An addition eight feet by ten feet has been built on kitchen, lantern deck recovered, rails renewed, new sill to window, new door and posts to oil store, and plaster repaired in two rooms.

Tor Bay.

The sum of \$25 has been expended in repairs to road leading from the station to the main road.

Three Top Island.

A boat-house and slip have been erected at landing.

White Head.

An addition of ten feet has been built on kitchen, and the interior of kitchen stripped, walls rendered between studs and ceiling re-plastered.

Cranberry Island.

A new boat slip has been erected at landing and roof of whistle-house repaired.

St. Esprit.

Lantern deck recovered, south side of tower stripped and shingled, spouts renewed and chimney repaired. Buildings painted.

Isle Outtigue.

Kitchen floor renewed and buildings painted.

Jerseyman's Island.

A lean-to built on side of oil store for accommodation of boat. Five outside sashes furnished. A new boat supplied and a set of new lamps. Buildings painted outside.

Point Tupper.

A wire fence has been erected around lighthouse lot, foundation wall of dwelling repaired and a wall under covered passage to lighthouse built. Eight outside sashes have been furnished to dwelling.

Canso Harbour.

Plaster repaired and leaks in windows stopped.

Sydney Harbour.

An umbrella fitted inside lantern to protect lamps from rain. Lighthouse painted outside.

Low Point.

Kitchen walls and ceiling plastered and ceiling in porch repaired.

Point Aconi.

An addition 10' x 14' has been built on north side of tower, the whole building re-shingled and buildings painted.

Piper's Cove.

Roof of oil store re-shingled.

Marjorie's Isle.

A shelter house has been erected for the accommodation of keeper.

Jerome Point.

A porch 6' x 4½' has been built at the front entrance, and boat repaired. Buildings painted outside.

Bird Island.

Oil store re-shingled, and new sills fitted to derrick at landing. Buildings painted outside.

Ingonish.

A new boat furnished.

Cape North.

Roof re-shingled, and broken plaster in two rooms repaired.

Cape St. Lawrence.

Buildings painted and slip repaired.

Port Hood.

And outhouse built, new fence erected and chimney and vane repaired.

Pomquet Island.

Kitchen secured to main building, foundation walls repaired and new frames fitted to cellar windows. Buildings painted outside.

Cheticamp.

New spindle and wheel supplied to revolving clock, new chimney built in kitchen and foundation wall repaired, buildings painted outside.

Eastern Harbour.

Both lots inclosed with picket fences.

Pictou Island.

A new lantern is to be furnished, and other repairs effected next year.

Pictou.

Shed re-shingled, chimney in kitchen repaired and new steps fitted to entrance door of dwelling.

Merigomishe.

Kitchen pump furnished and buildings painted outside.

Mullin's Point.

A lamp in the window of the dwelling-house of the late keeper at this station had been utilized as a back range light, but last year a change in the keepership was made and the owner of the dwelling-house refused to allow the old arrangement to continue: it consequently became necessary to provide a new back range tower, and in connection with that it was deemed advisable to provide a dwelling-house for the new light-keeper.

Tenders have been received for the necessary building, and a contract will immediately be awarded so that the new light may be in operation early next season. In the interval a temporary light from a pole has been maintained.

Chebucto Head.

New spouts fitted and buildings painted outside.

Croucher's Island.

A new line wire picket fence erected, boat repaired, chimney rebuilt from roof, and foundation wall pointed.

Hobson's Nose.

New boat supplied.

West Ironbound.

Leaks over windows in tower stopped and plaster in kitchen repaired.

Port Medway.

Outside shutters and sheathing over foundation wall repaired. Roof of oil store re-shingled.

Coffin's Island.

Foundation wall under lighthouse repaired.

Fort Point.

Shed attached to tower removed to corner of lot to be used as an oil store.

Gull Rock.

New boat supplied and six new copper smoke funnels fitted to lamp frame.

Carter's Island.

A new dory supplied.

Shelburne (Cape Roseway).

Fifty dollars expended on repairs to road leading from landing, and tramway repaired.

Sand Point (Shelburne Harbour).

The cribwork pier on which lighthouse stands is undergoing repairs and the lighthouse being painted outside.

Cape Negro.

Roof of dwelling re-shingled and kitchen doors repaired and new sills fitted.

Baccaro.

Six new copper smoke funnels fitted to lamp frame, lantern dock recovered and minor repairs made to building and plaster throughout the building. Drain wall rebuilt. Buildings painted outside.

Barrington Light Ship.

New lantern supplied. Moorings lifted and replaced and new anchor furnished.

Bon Portage.

New lamp frame, lamps and reflectors supplied and a new boat furnished.

Seal Island.

Boat slip at landing repaired.

Pubnico.

Roof of kitchen and dwelling on north side reshingled and buildings painted.

Fish Island.

Leaks in roof repaired and a new floor laid in porch and store at landing. Buildings painted outside.

Candlebox.

Boat slip extended one hundred feet. Well dug to supply fresh water. Two outside storm doors fitted to dwelling. A new dory furnished.

Cape Fourchu.

The keeper's dwelling which had been slightly damaged by lightning, has been repaired under the supervision of Mr. Amos McLellan.

Yarmouth Harbour.

A new concrete pier has been built at Bunker Island under the supervision of Mr. W. H. Noble, to replace the decayed wooden pier on which the lighthouse tower is built, and the tower is now being moved to the new pier.

Parrsboro'.

A new stone foundation wall has been built under tower, to replace the decayed wooden cribwork foundation, a porch built on entrance side of tower and roof reshingled. New sills put under foundation and lantern deck and sill renewed.

BUOY SERVICE.

Notwithstanding the severity of the weather during the past year, but little damage has been done to the large number of buoys now doing service on this exposed coast. This is largely attributable to the system of changing every six months as nearly as possible, and care exercised in examining moorings and placing in position.

The granite weights used instead of anchors as formerly, has also proved to be a better security against fouling and consequent dragging or parting of cable.

The following is a list of casualties :—

Brazil Rock Bell-buoy.

This buoy broke away from its moorings in May last, and was towed into Shelburne by the schooner "Fanny A. Spurling," with loss of moorings. Salvage \$281.25. It was subsequently brought to Halifax by the "Lansdowne."

Jig Rock Can-buoy.

Drifted from its position and towed into Sand Point, Shelburne. Brought home by "Newfield'."

Orpheus.

This buoy broke away from its moorings in last winter's gales, and was towed into Petite de Grat by fishermen with loss of moorings.

ADDITIONAL BUOYS AND CHANGES.

Egg Island.

An automatic whistling buoy, painted red, was moored on the 1st June last in 37 fathoms water, 5 miles S. Mag: from Egg Island Light, for the purpose of guarding vessels from the dangerous shoals in that vicinity, and as an additional leading or fairway-buoy to vessels seeking Halifax harbour. The usefulness of this buoy has since been most favourably noticed by captains of steamers and others.

Inner Automatic.

In consequence of the discovery of a 32 feet patch near the western extremity of Portuguese shoal, Halifax harbour, this buoy was moved about 3 cables N. W. by N. $\frac{1}{2}$ N. from its former position to a point in 20 fathoms water 3 cables S. W. $\frac{1}{2}$ W. from the 32 feet patch.

Thrum Cap.

The iron can buoy formerly marking the turning point at extremity of Thrum Cap Shoals, has been replaced by a bell buoy of the Trinity House pattern, surmounted by a spherical cage. This change has proved to be a great improvement.

Neverfail.

An iron spar buoy, painted red and black horizontal bands has been moored $1\frac{1}{2}$ cables S. from the $4\frac{1}{2}$ fathom line of the shoal.

Mars Rock.

The iron can buoy marking this shoal has been fitted with a staff carrying a flag or burgee made of sheet iron, to distinguish it more readily in thick or hazy weather from other similar buoys in the neighbourhood and to render it more conspicuous.

Tancook Islands.

A can buoy painted green has been moored alongside the sunken schooner "Emma Brown" about $\frac{1}{2}$ mile S.E. by S. from South Head, Great Tancook Island, near Lunenburg.

St. Ann's.

Two spar-buoys have been placed to mark the channel at entrance to St. Ann's harbour, Victoria County, Cape Breton.

SABLE ISLAND.

All the stations throughout the island were inspected by the superintendent of lights on the 15th and 16th July last and found to be in excellent order. During the past year a new building has been erected at the main station by the island staff under

the superintendent, for the better accommodation of the Beebe lifeboat and wagon and the rocket apparatus, the materials used being chiefly from the lumber saved from the wrecked brigantine "Kaluna."

Buoys.

Spare buoys.

Two whistling buoys have been made by the Truro Foundry and Machine Company at a cost of \$820 each, and supplied to the Halifax agency to be kept in stock to replace buoys adrift or requiring repairs.

St. John's Ledge.

A small bell buoy of United States pattern, which was established in 1891 off St. John Ledge in the Bay of Fundy, has been replaced by a larger bell buoy of the Trinity House pattern. The buoy is moored in 22 fathoms water, $1\frac{1}{4}$ miles S.W. by W. $1\frac{1}{4}$ W. from the middle of the ledge, and is painted red with "J. Ledge" in white letters on it.

On the 25th December, 1893, two automatic whistling buoys were established near Yarmouth, in the Bay of Fundy, to facilitate approach to the harbour. The more northerly buoy is moored in 22 fathoms water, 5 miles N.W. by W. from cape Fourchu light. It is a first-class Courtenay buoy, painted red, and surmounted by a 10 inch whistle operated by the motion of the buoy on the waves. The more southerly buoy known as the Yarmouth fairway whistling buoy is moored in 34 fathoms, 10 miles S.W. by W. $\frac{1}{2}$ W. from cape Fourchu light. It is a similar buoy, but is painted in black and red stripes. It is proposed next spring to change the colour of the Lurcher shoal whistling buoy from red to black and red bands with the letter **L** in white, so as to distinguish it from the cape Fourchu buoy.

NEW BRUNSWICK LIGHTHOUSE DIVISION.

There are in connection with this branch of the marine service, on the coast of New Brunswick, 117 lighthouses and 12 fog-alarms, attended by 87 lightkeepers and 12 engineers in charge of both lighthouses and fog-alarms, having with them 10 assistants, making in all 109 persons at those different stations.

REPAIRS AT EXISTING STATIONS.

Beacon lights, St. John Harbour.

Sundry repairs were made to the buildings at a cost of \$45.22, and the boat was also repaired.

Bliss Island.

Repairs were made to the dwelling house and the roof re-shingled. New sills were put under the barn. Cost of repairs \$115.89.

Big Duck Island, Fog-alarm.

The derrick was repaired and a coal shed and water tank built under direction of Mr. David Ross, carpenter, of Lansdowne, at a cost of \$472.40. The boiler was repaired and new tubes put in wherever required.

Cape Enragé.

The alarm was sounding from the 25th April to the 10th May, during which time a new smokestack was being erected. Fifty tons of coal were delivered at this station above high water mark, by Messrs. Townshend & Co., of Parrsboro', at a cost of \$275, and 10 cords of wood was supplied by Daniel Lingley at a cost of \$30.

The repairs to the slate roof and other mason work was performed by Frank Meliday, at a cost of \$97.73, which will appear in the account for the fiscal year 1893-94.

Cassies Point.

Sundry repairs were made at a cost of \$106.10.

Cape Spencer.

The roof of the dwelling house and tower were shingled during the year and a room lathed and plastered.

That part of the road leading from the last house on the public road to the lighthouse lot, was repaired at a cost of \$72.75. An annual allowance of \$10 will probably keep this road in order. The sum of \$25 was also expended upon the road from the lighthouse to the main road. This property is mostly owned by the department. New lamps and other repairs were made to the lantern by Mr. G. Hevenor, at a cost of \$59.95. The lighthouse tower and dwelling were painted by the keeper with the assistance of one man.

Musquash.

New lamps were provided and repairs to old ones made at a cost of \$20.52.

Escuminac.

A flat bottom boat was supplied to the station, made by Mr. William Tait at a cost of \$36. Thirty-one tons of coal was delivered by Noonan & Davis at a cost of \$172.64. Ten cords of wood were supplied by Mr. Nash at a cost of \$26.

Lower Fox Island Light.

Repairs were made to the tower at a cost of \$52.30.

Fort Folly.

Thirty-one dollars and twenty-five cents were expended for assistance in painting at this station.

Grand Manan Fog-alarm.

One thousand one hundred and ninety feet of new tubing were purchased from Thomas Robertson & Company, of Montreal, at 10½ cents per foot, and were inserted by a boiler-maker sent from St. John.

An abutment of 60 feet long, 16 feet wide on top, and 15 feet 6 inches high in the middle, was built during the past season to protect the fog-alarm building from the debris falling from the cliff. This work was under the charge of Mr. David

Ross, carpenter of the "Lansdowne," and its accounts will appear in the accounts for the present year.

One hundred and twenty-five tons of coal were landed at the station at a cost of \$687.50.

Hendry's Point.

As indicated in last year's report, it was found necessary to replace the lighthouse here by a new building. The contract was satisfactorily completed in July last by Mr. John A. Jones.

Head Harbour.

Lumber to the amount of \$47.55 was supplied to the station for repairing the platforms around the lighthouse. The keeper was directed to have the repairs made. The beams and floor covering of the reservoir in the fog-alarm had to be renewed as they were rotten.

Hay Island.

A new boat was built at a cost of \$25.

Indian Point, Shippegan Range.

New lantern and lamps were supplied to this station at a cost of \$37.91.

Letete Fog-alarm.

Repairs were made to the boiler at a cost of \$33, and a new smokestack was supplied at a cost of \$48.65.

Miramichi Light-ship.

In the spring of 1893, the bottom of the light-ship "Jenny" was cleaned, caulked where needed and copper painted, the rigging tarred down and repaired, the masts and bulwarks, all woodwork inside of the bulwarks, the top outside bulwarks and rail, were painted, the top sides caulked and repaired and the iron-work repaired. This work was done under contract by Mr. John Ferguson, the lowest bidder, at a cost of \$150.

Machias Seal Island.

New tubes were put in the boiler of the fog-alarm at a cost of \$55.25.

Midjic Bluff.

The sum of \$15 was paid Arthur Henderson for cutting down and removing trees that had obstructed the light.

Miscou Island.

A new boat was supplied for landing coal at a cost of \$60.

Mr. Robert Rivers delivered wood at a cost of \$70.

The illuminating apparatus at this station, which heretofore showed a fixed red light, has been replaced by a revolving apparatus, and on and after the opening of navigation in the spring of 1894, the light will show four bright flashes with inter-

vals of 15 seconds between their points of greatest brilliancy, followed by an interval of 30 seconds, during the greater part of which the light will be eclipsed, the light thus completing a revolution in $1\frac{1}{4}$ minutes. The apparatus is catoptric and the light should be visible in clear weather for a distance of 14 miles.

Musquash Island.

As indicated in last year's report, it was found necessary to replace the lighthouse at this station by a new building. The contract was satisfactorily completed by Mr. John A. Jones in July last.

Mark's Point.

The new stone piers and beams authorized last year were put under the building at a cost of \$25, and have made it safe and firm.

No Man's Friend.

The beacon tower at this place is much decayed, but it is proposed to repair it, it being the intention of the department to erect a lighthouse at Gagetown, on the opposite side of the river, to replace this light.

Neguac.

In previous years a range light on a mast which in line with the main light at the Gully indicated the best channel over the bar was maintained, but the channel became so tortuous that it was decided to discontinue this second light. Last spring, however, it was found that the two lights in range could again be utilized, and accordingly the small lantern on a mast was relighted and maintained throughout the season of navigation.

Partridge Island.

Repairs were made to the boiler and machinery of the fog-whistle with the assistance of Mr. John Smith, at a cost of \$91.88. A new set of fire bars, purchased from the Allan Foundry and Machine Works was put into the boiler at a cost of \$63.20.

Pokemouche.

Small repairs were made at this station at a cost of \$20.88.

Point Lepreaux.

A new flag staff has been erected, and the derrick repaired at a cost of \$38.

Repairs were made to the boiler of the fog alarm at a cost of \$30.

One hundred and twenty-nine tons of coal were delivered at the station by Messrs. Townshend & Co., at a cost of \$741.75.

St. Andrew's outer Light.

A new boat was supplied at a cost of \$21, and \$28 were spent for assistance in painting.

Pokesudie.

The illuminating apparatus at this station has been changed, the lamp and reflectors having been removed and replaced by a dioptric lens of small size, purchased from Messrs. Chance Brothers, at a cost of \$73.

Quaco.

New tubes were placed in the boiler of the fog-alarm and the boiler repaired, at a cost of \$100.53.

Richibucto.

New boat supplied at a cost of \$45.67.

Richibucto Beacon.

Repairs made at this station by Mr. F. S. Peters, at a cost of \$99.

South Tracadie

New boat supplied at a cost of \$28.

Swallowtail.

A new boat was supplied at a cost of \$25, and an assortment of lumber to the amount of \$35.50 was also supplied. The old bridge between the dwelling and light was rebuilt. The steps up the high cliff from the lighthouse to the main landing being examined were found in a rotten and dangerous condition; the old ones are being removed and new steps are being laid in their place; Mr. Ross assisted the keeper in doing the work.

Shediac Island.

One of the beacons was destroyed by lightning last year and a temporary mast light was erected at a cost of \$33.78.

South-west Head, Grand Manan.

Fifteen dollars were spent in hiring a man to assist the keeper in painting the building. Lumber was supplied and the keeper made requisite repairs to the station.

North Tracadie range lights.

In consequence of the wearing away of the sand beach it was found necessary to remove the range lights at North Tracadie Gully and the front light was accordingly moved last winter to a position near the former position of the main tower, and the main light moved to a point 600 feet further back. Upon the opening of navigation it was found that the point continued wearing away and that the lights could not safely be maintained on the north side of the gully; the towers were consequently removed to new sites on the south side. The back range light tower now stands well out on the point on the south side of the gully; it is a square, wooden building, painted white, and is 33 feet high from its base to the vane on the lantern. The light is fixed white, catoptric, elevated 30 feet above high water mark, and should be visible 10 miles from all points of approach.

The front range light mast is on the beach 450 feet S.E. $\frac{1}{4}$ E. from the main tower. The fixed white catoptric light is shown from a lantern hoisted on a mast, having a shed at its base, the whole painted red. Height from ground to top of mast 23 feet. The light is 23 feet above high water mark, and should be visible 8 miles in and over a small arc on each side of the line of range.

The two lights in range N.W. $\frac{1}{4}$ W. lead over the bar outside the gully, from the outside buoy to a point opposite the second red buoy, whence the course is N.W. by N., opening the main tower to the northward until inside the harbour.

The main light is useful as a coast light, but nothing larger than fishing boats should attempt to enter the gully at night, and no stranger must attempt the entrance without a pilot. The front light is liable to be moved to suit changes in the channel over the bar.

Bridges Point.

The Chief Engineer of the department inspected this light last July and reports that the tower has been badly placed and is not sufficiently high. The necessary steps to remedy these defects are being taken.

Oromocto.

The new site necessary for this light has been surveyed and arrangements made for its purchase, and plans have been prepared for the new tower required.

Cape Tormentine.

A new building has been erected at Cape Tormentine to accommodate the ice boats for the mail service between the Capes, and also to accommodate the life-boat established at this point. The building is located immediately north of the railway track at Cape Tormentine wharf, and close to high water mark, so as to facilitate the launching of the boats.

The necessary building was erected from plans prepared in the department under contract by Messrs. Rhodes, Curry & Co., the lowest tenderers, their price being \$1,890.

BUOYS AND BEACONS.

There are 852 buoys under the management of this agency, 57 coast buoys and 795 harbour and channel buoys.

The department purchased chain, links and shackles to the amount of \$1,411.59 from Messrs. Timothy Parks & Son.

Three new bell buoys were purchased from Mr. Geo. Matheson at a cost of \$2,805.

Bell buoy off Partridge Island.

This buoy was repaired in the spring and replaced by the steamer "Lansdowne," and to all appearances is in good order.

Black Rock Automatic Buoy.

This buoy was lifted in August last, the moorings overhauled and another moored in its place. The work was done by the steamer "Lansdowne."

Blond Rock Automatic Buoy.

The "Lansdowne" placed a new buoy and moorings at this place on the 17th March, and brought the buoy that had been there during the winter to St. John.

In lifting the buoy on board the steamer the chain parted, and about 30 fathoms was lost.

The only way to account for buoys moored at this place breaking adrift so often is that the chain wears considerably and catches under the rocks, and in heavy weather the surging of the buoy to and fro breaks the chain.

Chebogue Ledge Buoy.

This buoy broke from its moorings, and was recovered; the sum of \$32 was paid to Eben Scott for salvage and repairs.

Lower end of Grand Lake and Jemseg Buoys.

Mr. Herbert Currie is contractor. The buoying and bushing of this district by the contractor has not been satisfactorily carried out. The department had to supply and place buoys this season which will be charged against that service.

North-west Ledge Buoy.

This buoy broke from its moorings and was picked up on the 24th February 1893, about half a mile above low ledge, and was towed into Westport. The amount paid to SS. "Westport" and crew for salvage was \$112.

Old Man Buoy.

An iron can buoy was placed on this ledge in place of a spar buoy. The buoy was purchased from Eben Scott for \$50.00.

Quaco Buoys.

The Quaco Ledge bell buoy was picked up by the "Lansdowne" about 6 miles N. N.-W from Isle-Haute at anchor, the buoy having been carried there by the ice. The buoy was damaged by some vessel. The bell buoy moored off the light-house reef has not been recovered.

West Isles Buoys.

Mr. D. L. Martin is contractor; amount of contract is \$209 per annum.

Three extra spar buoys were placed in this district at a cost of \$45; and a new spindle was erected at a cost of \$40 which the contractor has agreed to keep in repair for \$12.50 per annum. The contract expires in April, 1894.

STEAMER "LANSDOWNE."

Captain Dakin's services were dispensed with by the department, and the first mate, Mr. George W. J. Bissett was placed in command. Mr. J. F. Wiffin was appointed first mate; and Mr. John L. Moury second mate.

The following repairs were made to the steamer "Lansdowne" by W. H. Knight, ship carpenter :

On starboard side, 2 planks on topsides, and covering board—extent—35 feet.
On larboard side, 4 planks and one piece of covering board.

After beam, top gailant, forecastle and covering board.

PRINCE EDWARD ISLAND DIVISION.

This division is under the charge of Mr. Artemas Lord, agent of the department at Charlottetown.

In it there are 52 lights at 34 stations and 1 steam fog-horn, under the charge of 40 keepers. There are two automatic whistling buoys and one bell-buoy in this agency. The majority of the lights are situated on headlands and serve the general purposes of navigation, the remainder being harbour lights intended particularly for the benefit of fishermen. Thirty-five harbours in this province are buoyed by the department under contract ; the buoys being under the general supervision of the agent.

The lights were as usual inspected during the summer season by the agent in the Government schooner "Prince Edward" which also delivered the lighthouse supplies. The agent reports a continuous and increasing endeavour on the part of the light-keepers to keep up the required efficiency.

REPAIRS AND IMPROVEMENTS TO LIGHT STATIONS.

The following is a statement of the more important repairs and improvements made at the several stations during the past year. Some small repairs and the ordinary painting and maintenance of the stations are not included in this statement.

Tignish Run.

The canvas lantern deck renewed by Mr. Milton Walsh. Two new panes of plate glass were provided and corners of tower repaired.

Sandy Island, Cascumpec.

A new piece of brushwork protection was built by Mr. Montgomery during the past winter under contract, for the sum of \$140, and is withstanding the sea satisfactorily.

Alberton.

The inner range light has been moved about 30 feet south, to range clear of a sand spit that was found to be making out northwards from the south bar. The beacon attached to the outer range mast has been renewed and made three feet larger on each end and side and extended up five feet beyond the top of the mast. This was done so that the beacon might show as a day mark above some houses situated between the two range lights. The cost of these changes was \$32.23.

Fish Island, Malpeque.

A new boat house and launching ways were built by the crew of the supply steamer "Prince Edward," under the immediate supervision of Mr. Lord, and a new boat was provided.

Darnley Range.

New lantern and illuminating apparatus made by Mr. Walsh in the agency store at Charlottetown, were supplied to this station.

Grand Tracadie.

The inner range tower at this station having become unsafe through dry rot, a contract for a new tower was awarded to Mr. James Handrahan, at a cost of \$220.

St. Peter's Harbour.

The back range light which had got out of plumb in consequence of the sinking of the end of the breakwater on which it stands, has been levelled under contract with Mr. John Gennett, at a cost of \$15.

Wood Island.

The fence at this station has been renewed, materials being provided by the department at a cost of \$37.66, and most of the work being done by the light-keeper.

Cape Bear.

An arrangement was made to sink a well at this station, and a hole 60 feet deep has been bored, but no water found. This work was done without expense to the department as the contractor undertook it on condition of being successful before receiving any remuneration.

Panmuir Island.

The fence and cottage roof have been repaired.

Souris.

During a south-east gale on the 21st August last, the mast and shed on the end of the breakwater were carried away but were replaced at once. The force of the storm is indicated by the fact that about 150 feet of the middle section of the breakwater was also broken up.

St. Peter's Island.

An 8-inch pressed glass lens, fitted with Hincks duplex burner lamp was established in this station as an auxiliary to the anchor light lens heretofore in use, and which was not found sufficiently powerful. This was fitted up from agency stores by Mr. Walsh.

Cove Head.

The arrangement of the range lights at the entrance to this harbour has been changed. The front light is now close to the edge of the sand beach at the entrance to the harbour. It is elevated 18 feet above high water mark, and is a fixed white light, shown from a lantern hoisted on a mast 17 feet high, and visible over three miles from all points of approach.

The back light is located 225 feet S.W. from the front one. It is also fixed white, elevated 25 feet above high water mark, and is visible three miles from all points of approach.

The lantern is hoisted on a mast 27 feet high. The position of the light is liable to be moved to suit the changes in the channel, and only 3 feet can be depended on at low water on the bar.

Buoys.

North Point.

It has been determined to establish an automatic whistling buoy on the end of the reef off North Point, Prince Edward Island. The contract for the construction of this buoy, and also for the construction of a spare automatic whistling buoy, to be kept in stock as a spare buoy, to replace the whistling buoy off Rifle Reef and Tryon Shoal or North Point, as required, has been awarded to the Truro Machine and Foundry Company, who agree to deliver the two buoys on the opening of navigation next year at Pictou, at a cost of \$820 apiece.

BRITISH COLUMBIA LIGHTHOUSE DIVISION.

This division comprises all Canadian waters on the Pacific coast, and is under the charge of Capt. James Gaudin, agent of the department at Victoria.

There are in this province thirteen light stations, five of which are steam fog-alarms, and at three others, bells rung by machinery. There are also four lighted buoys, at two stations. The above are in charge of fifteen keepers, some of whom supply assistants out of the salaries allowed.

NEW FOG-ALARMS.

Active Pass.

The establishment of a steam fog-alarm at this station has been carried out on the lines indicated in last year's report. The necessary building and tank, and tank-house for the collection of rain-water, were erected by contract by Messrs. Crowe & Wilson, of Vancouver, at a cost of \$2,080.

The fog-alarm was put in operation on the 15th October last, and consists of blasts of 6 seconds duration from a horn, with intervals of 24 seconds between the blasts. The fog-bell previously maintained at the station has been discontinued.

The fog-alarm building is a square wooden building, painted white, with a brown roof, and stands within 70 feet of the extremity of Georgina Point, Active Pass, north-east of the lighthouse.

The horns face north and are elevated about 20 feet above high water mark. The water tank-house, also of wood, painted white, stands behind the fog-alarm building. The machinery is in duplicate, so that in the event of horn or boiler becoming inoperative the other may be used.

The total expenditure in connection with the establishment of this fog-alarm station has been \$5,089.75.

Entrance Island.

Steps have been taken to establish a steam fog-alarm at this station.

Plans and specifications have been prepared and a contract awarded to the lowest tenderers, Messrs. Baynes & Horie, for the erection of the necessary buildings, and also for the erection of a large water tank with a shed to cover it. The contract price is \$2,075, and the work will be proceeded with early in the spring. Boilers and fog-alarm machinery in duplicate have been forwarded from Messrs. Carrière, Laine & Company of Lévis, Quebec, the makers, and are now on the island ready to be placed in the building when erected.

REPAIRS AT EXISTING STATIONS.

Race Rock.

The keeper has cleared away a lot of loose stones from the approaches to the landing place.

Cape Beale.

A new clock work machine made by E. Chanteloup, Montreal, has been supplied and set up by Mr. G. F. Grant, engineer of the "Quadra" and the old clock work has been taken into store in Ottawa for repairs. The cost of the new machine was \$662.50.

Considerable repairs have been made to some of the out-buildings, the store-room has been re-floored, re-shingled and the broken windows renewed by some workmen, and the crew of the "Quadra."

The trail to Bamfield Creek has been cleared in the usual way for the year. The tramway has been overhauled, and such temporary repairs effected as to insure its stability for another year.

Carmanah.

A watch-room has been built and a fence erected around the buildings, which has greatly improved the appearance of the station from seaward.

Beren's Island.

The tower and dwelling have had the weather boarding removed and the walls shingled, and storm windows have been put in on the most exposed sides.

During last winter's gales the boat landing was torn away and the boat broken. The stage has been renewed and a new boat supplied.

East Point, Saturna Island.

The boat-ways, which had been completely destroyed by the "teredo" were replaced by the keeper with a little assistance. A new pump and sink have also been supplied.

Sand Heads.

A new boat has been supplied to replace one stolen from the keeper.

Point Atkinson.

A new roof has been put on the kitchen.

Brocton Point.

The keeper has erected a small house for himself at the back of the tower without expense to the department.

Nanaimo Harbour Lights.

A boathouse has been built for the use of the keeper of the buoy lights in Nanaimo harbour, which also serves as a store-room for oil, etc. Since its erection the boathouse was upset by a gale and has been re-erected.

BUOYS AND BEACONS.

Buoy on Alford Reef.

The establishment of a large spar buoy on Alford reef in the approach to Metlah Catlah has been authorized, and a buoy will be placed on the next trip north of the "Quadra."

Fraser River buoys.

Owing to the high stage of the water on the Fraser River and the swiftness of the current, these buoys were dragged with the moorings into the Gulf of Georgia, and a considerable expense incurred in the salving. They have all been picked up and re-established in good order. This work is carried on by the snag-boat "Sampson," which proves to be well adapted for this service.

Sturgeon Bank beacons.

The north and south pile beacons on Sturgeon Bank, off the mouth of the Fraser River, were carried away last spring, but were replaced at a cost of \$136.37.

Grassy Point beacon.

The single pile beacon off Grassy Point, in Baynes Sound, has been carried away, and has been temporarily replaced by a buoy. It is proposed to renew it at the first opportunity.

Kelp Reef beacon.

In accordance with the proposal described in previous reports a stone masonry beacon has been built on Kelp Reef, Haro Strait. This work was done under the direct supervision of the agent, and principally by the crew of the Dominion steamer "Quadra." The total expenditure in connection with it was \$673.92.

The beacon stands upon that part of the reef which uncovers at low water. The masonry is in the form of the frustum of a cone, 16 feet in diameter at the base, 9 feet in diameter at the top and 20 feet high. The staff and ball rise 12 feet above the stonework and are painted black. The stonework is 10 feet, and the top of the ball 22 feet above high water mark.

The spar buoy heretofore marking the reef became unnecessary in consequence of the establishment of this beacen, and has been removed.

Six-foot buoys.

As indicated in last year's report, two new steel can-buoys 6 feet in diameter, surmounted by masts and cages, were made by the British Columbia Iron Works,

the contract price being \$415 for each buoy. One of these buoys has been used to replace the conical buoy heretofore marking Gabriola Reef.

Five-foot buoys.

Six steel can-buoys, 5 feet in diameter, were also made for this agency, by Mr. W. G. Matheson, of New Glasgow, N.S., his price being \$167.75 for each buoy delivered in Vancouver, this price being much lower than any local tender. Three of these buoys have been utilized to replace the solid cedar can-buoys at the following places, viz.: Gossip Reef, at the Strait of Georgia entrance to Active Pass; Lighthouse island reef, entrance to Nanaimo harbour; and Hornewell reef, in Departure Bay.

Brotsky Ledge beacon.

The masonry beacon erected on Brotsky Ledge has not yet been undertaken, as the ledge is still marked by the wreck of the steamer "San Pedro."

American lights.

The attention of the American Government was some two or three years ago directed to the necessity for lights and fog-alarms on Turn Point and Patos Island, in the Canal de Haro, and in November last, a stake light and a Daboll trumpet fog-alarm were put in operation at each of these stations. These two aids to navigation will greatly improve the route between Victoria and Vancouver.

BUOYS AND BEACONS.

There are about 300 harbours, bays and sections of rivers buoyed in the Dominion of Canada. In most cases contracts have been entered into to maintain the buoy service for three years. In some instances the buoys are placed by the harbour masters, who furnish accounts to the department for the work done and material supplied.

The expenditure in connection with the buoy service for the year ended 30th June, 1893, was as follows:—

For the province of Quebec, including port of Montreal....	\$20,783 87
Above Montreal, including Ontario.. .. .	4,542 45
New Brunswick.....	12,627 53
Nova Scotia.....	13,428 43
Prince Edward Island	2,873 36
British Columbia.....	4,683 40
	<hr/>
	\$58,939 04

This includes the expenditure incurred in the construction of new automatic buoys and maintaining all the buoys of this character.

OILS FOR THE USE OF LIGHTHOUSES.

The oil for lighthouse purposes has been purchased from the Imperial Oil Company of Petrolia, by contract, which was entered into on the 11th March last for a

period of three years. Tenders were invited by public notice and the lowest tender was accepted.

The quantity of oil supplied to the lights above Montreal, by the Imperial Oil Company during the year 1893, was 23,130 gallons imperial measure, costing \$3,819.83; to the lights in the Quebec district, 26,080 gallons, costing \$4,641.42; to the Nova Scotia district, 53,564 gallons, costing \$11,804.32; to the New Brunswick district, 11,580 gallons, at a cost of \$2,274.34; to the Prince Edward Island district, 4,992 gallons, at a cost of \$1,148.10; making the total quantity received from the Imperial Oil Company 119,346 gallons, and the total cost \$23,688.10. In addition to this the department purchased from the Standard Oil Company of New York, 2,700 gallons American oil for the New Brunswick district, at a cost of \$459; 8,990 gallons for the Nova Scotia district, at a cost of \$1,528.30; and 1,450 gallons for the district above Montreal, at a cost of \$246.50; for the British Columbia district, 5,750 gallons, at a cost of \$1,092.50.

The total quantity of American oil purchased was 18,890 gallons, wine measure, costing \$3,326.30.

The list of prices according to contract is as follows :—

Delivered at.	Per gallon in Barrels.	Per gallon in Cases.
	cts.	cts.
Sarnia	14½	19
Hamilton	15½	20½
Kingston.	16½	21
Montreal.	16½	21½
Quebec.	17	21½
St. John, N.B.	17½	22
Pictou, N.S.	18	23
Halifax	17½	22
Charlottetown, P.E.I.	18	23

DOMINION SETAMERS.

"NEWFIELD."

The steamer "Newfield" was stranded about the middle of August, 1892, while off North Canso light. The officers of the department at Halifax were instructed to proceed with necessary appliances, &c., to North Canso, and to use all the means that prudent owners would do to save the "Newfield." The "Newfield" was drawn off the rocky bottom by the government steamers "Stanley" and "La Canadiene," was taken to Port Hawkesbury and placed upon the marine slip. The vessel was found to be seriously injured. Tenders were invited by public notice for repairs to the "Newfield." These repairs included what was necessary to make the steamer staunch and seaworthy as well as repairing the damage sustained by stranding. The tender of Mr. Samuel M. Brookfield for \$16,500 was the lowest received and was accepted. The "Newfield" was taken to Halifax by the contractor, and the repairs were made according to contract. The amount paid in connection with floating the vessel at North Canso and the use of the marine slip at Hawkesbury was \$4,264.91, added

to \$16,500 makes a total of \$20,774.91. The "Newfield" was put in commission under the command of Captain Aitkens on the 24th April, 1893. The vessel, however, made two trips previous to this date, one on the 16th March in search of the ss. "Sarnia" and another to place the Brazil Rock bell-buoy, on the 3rd April. From the date of going into commission the "Newfield" was employed in placing the eastern coast buoys, supplying the lighthouse, including Sable Island, St. Paul's Island and Cape Race, and in changing coast and harbour buoys.

"THE LANSDOWNE."

The ss. "Lansdowne" was employed from the 1st July, 1892, to the 30th June 1893, in lighthouse and buoy service in the provinces of New Brunswick and Nova Scotia. On September 23rd, 1892, the "Lansdowne" arrived at Halifax and took on board the supplies to be delivered at certain stations in Nova Scotia. During the fall this vessel was employed in delivering coal to the fog-alarms and attending the coast buoys, some of which were painted and replaced. In the winter months the "Lansdowne" was engaged in the same work, and visited Sable Island with supplies for the stations. The steamer returned to the New Brunswick agency in the latter part of March, 1893, visited Quaco in search of the bell-buoy, which was found and taken to St. John. On the 13th April, the "Lansdowne" was placed upon the Gridiron in St. John for repairs and remained until the 26th May.

Mr. W. L. Waring reported on the 29th March, 1893, that repairs were necessary to the hull, engines, boiler, etc., of the "Lansdowne."

The necessary repairs were made to the hull, etc., by Mr. James Elliott. Planks were replaced on the starboard and larboard sides; the keelson, gangway and stanchions were renewed. Chain plates on starboard and port side were shifted.

Graving pieces were put around deck and stocks of both anchors shifted, also head rail and hoisting gear and the vessel was caulked from keel to gunwale, also the deck.

Repairs were also made to the engine and boiler by Messrs. McLauchlin & Co., to the amount of \$1,171.55. One of the tanks of the steamer was also increased in size by Messrs. McLauchlan at a cost of \$60. The "Lansdowne" was placed in commission on the 27th May, and was engaged in supplying fog-alarm stations with coal and lighthouses with oil and other articles until 30th June.

"STANLEY."

The steamer "Stanley" began her work in November, 1892, by securing the automatic buoys belonging to Indian Rocks and Tryon Shoals, which were taken to Charlottetown. The winter service was begun on the 1st of December as advertised. The steamer continued on the route between Charlottetown and Pictou until the 24th of December; after that date her trips were made between Georgetown and Pictou during the winter. On the 17th February, this steamer was laid up at Georgetown for the purpose of cleaning the boilers. On the 1st March the trips were resumed, but on the sixth of the same month while working in heavy ice her propeller blades were broken. The steamer reached Pictou on the 8th, and the engineers, crew and labourers were engaged up to the 18th tipping the vessel forward to enable them to take off the old blades from the propeller and put on new ones. The "Stanley"

resumed her work on the Georgetown-Pictou Route until the 7th of April, when she began to ply between Charlottetown and Pictou and continued on that route until the 21st of April. The vessel was then placed upon the slip at Pictou and prepared for the Fisheries Protective Service. During the winter 70 round trips were made. The gross earnings were \$10,955.50, and cost of maintenance \$16,228.39.

"ALERT."

On the 6th July, this steamer left Quebec to replace buoys at St. Croix. A special trip was made on the 8th of the same month with officers and men of B Battery to assist the "Constance," in the capturing of smugglers at Trinity Bay. On the return of the "Alert" stores were placed on board and the vessel proceeded on the 16th to supply light stations on the shores of the Gulf of St. Lawrence and the Straits of Belle Isle. On her return to Quebec, the vessel was placed in the graving dock for repairs. The work was resumed on the 21st September, and gas and other buoys were attended to, after which a full cargo of supplies and provisions were taken on board for lights in the Gulf of St. Lawrence and Straits of Belle Isle. From that time forward the vessel was constantly engaged in attending lights, gas buoys and lightships until the 23rd of November, when she was placed in winter quarters. The "Alert" began work on the 17th April, 1893, and was regularly employed in attending to buoy service and towing lightships, to their positions until the 14th of May. On that day the steamer was sent to bring up to Quebec the passengers of the stranded steamship "Wandhram." Supplies for light-houses were placed on board and the vessel left Quebec, on the 20th of June, for Baie des Chaleurs, Magdalen Islands, Gaspé Coast and north and south shores of the St. Lawrence River.

The "Alert" was in active service 204 days, undergoing repairs and securing outfit 30 days, and was in winter quarters 132 days.

During the absence of the "Alert" from Quebec the steamer "Anglesea" was hired at a cost of \$2,600 to attend to gas and other buoys.

"DRUID."

The "Druid" was engaged in quarantine service for the Department of Agriculture, but remaining under the control of the Department of Marine and Fisheries. The cost of maintaining the officers and men was about 40 cents per day.

"DOLPHIN."

The "Dolphin" has for many years been used as a patrol boat in Quebec harbour by the Harbour Police but since the force has been disbanded the launch has been used for other services.

"QUADRA."

The "Quadra," was employed in the general lighthouse and buoy service in British Columbia. A special trip was made to the west coast of Vancouver Island, for the purpose of collecting evidence in the Behring Sea arbitration. A similar trip was made and then the steamer entered upon the regular service of attending lighthouses and completing buoy service. This vessel was laid up for the

winter months on the 30th of November, 1892. During the winter months the vessel was thoroughly cleaned and painted. The "Quadra," was again put in commission on the 15th March, 1893, but was unable to do much of her usual work, in the early spring, as she was sent on a special trip with a Police Force under the Provincial Government, ordered to Kitkatla and other points north, to quell an Indian disturbance. One month was also occupied in assisting the International Boundary Commissioner in distributing his survey parties on the coast of Alaska. The steamer returned to Victoria on the 22nd May, and has been engaged in the general work of the agency since that date.

"SIR JAMES DOUGLAS."

When the new steamer "Quadra" took the place of the "Sir James Douglas," in British Columbia, the department had not sufficient work to keep the latter steamer constantly employed; tenders were, therefore, invited for the purchase of the "Douglas." No tenders were received. The department, with a view of making use of the steamer, caused an examination of the machinery and boiler to be made, which showed that the boiler had collapsed and was unsafe. The cost of a new boiler and other repairs, it was reported, would be in the vicinity of \$6,000. As no special reason has presented itself during the past year for incurring this expense the steamer has been allowed to remain out of commission.

"BAYFIELD."

The "Bayfield" is a wooden steamer of 150 tons gross and 90 tons register and is employed for the purpose of the hydrographic survey of Georgian Bay. This vessel left Owen Sound on the 4th May, 1893, and was employed on her usual work during the season.

The following statement shows the expenditure for maintenance and repairs of each steamer, and the receipts for the fiscal year ended 30th June, 1893.

	Repairs.	Main- tenance.	Total.	Receipts.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
"Newfield".....	21,993 41	15,470 23	37,463 64	
"Stanley".....	3,942 38	18,718 42	22,660 80	10,955 50
"Lansdowne".....	6,282 91	21,297 82	27,580 73	
"Quadra".....	1,185 32	27,408 59	28,593 91	2,253 96
"Alert".....	1,381 17	17,573 21	18,954 38	
"Druid".....	603 91	7,106 47	7,710 38	
"Sir James Douglas".....	62 20	2,193 95	2,256 24	
	35,451 39	109,768 69	145,220 08	13,209 46

Expenditure	\$145,220 08
Receipts	13,209 46
Excess of expenditure.....	\$132,010 62

COST OF MAINTAINING LIGHTHOUSES AND DOMINION STEAMERS.

The following comparative statement shows the expenditure on account of maintenance of lighthouses, steam fog-whistles, and steam fog-horns from the years 1883-84 to 1892-93, both inclusive. The method of auditing all accounts in the department before payment, has been followed of late years:—

Year.	No. of Lights.	No. of Fog-whistles.	No. of Fog-horns, Bell and Bombs.	Cost of Maintenance.
				\$ cts.
1883-84	597	23	10	456,868 33
1884-85	617	23	12	478,064 04
1885-86	625	23	16	505,929 27
1886-87	658	23	24	476,514 44
1887-88	664	23	27	464,471 76
1888-89	675	24	29	459,423 80
1889-90	705	23	32	434,802 10
1890-91	710	23	31	455,254 42
1891-92	741	22	56	445,140 16
1892-93	747	22	56	480,553 42

STATEMENT showing cost of maintaining Dominion Steamers from 1884 to 1892.

Year.	Cost of Maintenance.
	\$ cts.
1883-84	123,816 25
1884-85	148,864 26
1885-86	130,759 83
1886-87	141,424 42
1887-88	150,659 19
1888-89	126,629 33
1889-90	114,959 20
1890-91	111,437 03
1891-92	127,406 28
1892-93	146,521 77

HARBOUR POLICE.

An Act to amend the Act respecting the Harbour and River Police of the province of Quebec, was assented to on the 1st April, 1893. The Act provided for the abolition of the tonnage duty which had been levied for the maintenance of harbour police, when the force ceased to be maintained.

For numerous reasons already made public by the Minister of Marine and Fisheries, in Parliament, it was considered advisable to disband the harbour and river police force of the port of Quebec. It was found that vessels arriving in United States ports from the province of Quebec, were compelled to pay dues owing

to the fact that tonnage dues were collected from foreign vessels arriving in Quebec for harbour police purposes. The Quebec Board of Trade, in a memorial asked among other things, that the tax be abolished. Vessels arriving from ports in Ontario were exempted from certain fees in United States ports, whilst Quebec vessels were compelled to pay all port charges.

It was also found that the causes which originally existed for the maintenance of a harbour police force have not existed within recent years. An Order in Council was issued on the 20th April, 1893, disbanding the harbour and river police at Quebec, and giving authority for the payment of gratuities voted by Parliament, to the members of the force. The total amount paid was \$3,103.00.

CERTIFICATES TO MASTERS AND MATES FOREIGN SEA-GOING.

The report of the chairman of the Board of Examiners of Masters and Mates of sea-going ships for the twelve months ending 30th June, 1893, will appear as an appendix to this report.

During the past twelve months it will be seen by reference to the report in the appendix, the Board of Examiners have held meetings for the examination of candidates at the ports of Halifax, N.S., St. John, N.B., Quebec and Yarmouth, N.S. Ninety-six candidates presented themselves for examination at the ports named; 64 succeeded in passing, while 32 failed. Of the 64 that passed, 24 received certificates as master and 40 as mate.

The number of candidates who have passed and obtained sea-going masters' certificates of competency since the Act went into operation, viz., 16th September, 1871, to the 30th June, 1893, is 1,848, and the amount paid for certificates at the rate of \$10 each, \$18,480. During the same period 1,271 candidates received certificates of competency as mate, and the amount paid, at the rate of \$5 each was \$6,355.

In an appendix to this report a list will be found of all who have obtained certificates of competency and service, either as master or mate, during the year ended 30th June, 1893.

During the past eighteen months 4 certificates of service, foreign sea-going, have been granted.

INLAND AND COASTING CERTIFICATES.

During the twelve months ended 30th June, 1893, the number of candidates who have passed and obtained masters' certificates of service is 62, and the amount paid for their certificates at the rate of \$4 each was \$248. During the same period 21 candidates applied for certificates of service as mate, and the amount paid at the rate of \$2 each was \$42.

Applicants for certificates of competency as master number 140, and the amount paid at the rate of \$8 each was \$1,120. Seventy-five applied for certificates of competency as mate, and the amount paid at the rate of \$4 each was \$300. The amount received for renewed certificates of competency and service was \$83.50, making a total of \$1,793.50 received from masters' and mates' inland and coasting certificates.

A list of certificates issued during the twelve months ended 30th June, 1893, will be found in the supplement to this report.

The total amount of fees received on account of certificates of competency and service, sea-going and inland and coasting, during the fiscal year ended 30th June, 1893, amounted to \$2,484, and the amount in detail expended on account of this service, as will be seen by reference to Appendix No. 1, to this report, was \$4,116.99. The vote for this service was \$5,000, and the sum expended to 30th June, 1893, \$4,116.99, leaving an unexpended balance of \$883.01. A list of certificates cancelled during the last six months will also be found in the supplement to this report.

The following statement shows the total receipts and expenditure on account of masters and mates since 1871:—

		Expenditure.	Receipts.
		\$ cts.	\$ cts.
For the fiscal year ended 30th June, 1871		1,410 45	
do do 1872		4,312 07	1,344 00
do do 1873		6,406 18	4,963 00
do do 1874		4,520 19	2,995 00
do do 1875		5,696 62	2,715 00
do do 1876		4,672 08	2,021 87
do do 1877		4,050 00	1,740 50
do do 1878		4,249 76	1,296 50
do do 1879		4,250 12	1,334 50
do do 1880		4,253 43	1,547 00
do do 1881		3,888 41	1,333 50
do do 1882		3,965 19	1,152 50
do do 1883		4,021 20	1,314 00
do do 1884		3,909 59	9,437 50
do do 1885		4,324 15	2,897 00
do do 1886		5,245 28	2,152 00
do do 1887		4,855 98	2,172 00
do do 1888		5,060 96	3,220 80
do do 1889		4,381 04	2,202 00
do do 1890		4,117 83	2,186 00
do do 1891		4,255 24	2,586 00
do do 1892		4,563 88	2,149 00
do do 1893		4,116 99	2,484 00
Receipts		100,386 64	55,243 67
Excess of expenditure over receipts		45,142 97	

WRECKS AND CASUALTIES.

The total number of casualties to British, Canadian and foreign sea-going vessels reported to the department as having occurred in Canadian waters and to Canadian sea-going vessels in waters other than those of Canada during the twelve months ended 31st December, 1893, was 190, representing a tonnage of 59,421 tons register, and the amount of loss, both partial and total, to vessels and cargoes so far as ascertained was \$807,113.

The number of lives reported lost in connection with these casualties was 49. A statement of the wrecks and casualties forms an appendix to this Report.

SEAGOING CERTIFICATES.

The question of providing greater safety for life and property on ship-board not only by having ships and steamships undergo supervision, but also that the persons navigating them should furnish some evidence of their competency to fill the position in which they are placed, had more or less agitated the public mind in the United Kingdom from 1843 to 1854, when the matter took definite shape in the enactments contained in the Merchant Shipping Act of 1854. In 1836, a select committee appointed by the Imperial Parliament to inquire into the increased number of shipwrecks reported:—

“That the frequent incompetency of masters and officers appears to be admitted on all hands, this incompetency sometimes arising from the want of skill and knowledge in seamanship, but more frequently from the want of an adequate knowledge of navigation; it being proved that some masters of merchant vessels have been appointed to command after having been for a very short time at sea; that others have hardly known how to trace a ship's course on the chart, or how to ascertain the latitude by a meridian altitude of the sun; that many are unacquainted with the use of the chronometer, and that very few indeed are competent to ascertain the longitude by lunar observations; while some are appointed to command merchant vessels at periods of such extreme youth (one instance is given of a boy of 14, all of whose apprentices were older than himself), and others so wholly destitute of maritime experiences (another instance being given of a porter from a shipowner's warehouse who was made a captain of one of his ships), that vessels have been met with at sea who were out of their reckoning by several hundreds of miles, and others have been wrecked on coasts from which they believed themselves to have been hundreds of miles distant at the time.”

In 1843, a select committee on shipwreck, appointed by the British House of Commons, reported that on the question of the competency of masters and mates, the evidence taken was somewhat contradictory; most of the leading shipowners being hostile to the establishment of boards to examine masters and mates, claiming that compulsory examination was an unnecessary interference with their right to select such persons as they think would serve them best in the various duties allotted to them.

In 1850, a measure was introduced in the Imperial Parliament, with the object of requiring that every one who undertook the responsibility of commanding a ship should satisfy some competent tribunal that they were not deficient in the necessary qualification and during the discussion which ensued, instances were given where men grossly unfit had been placed in charge of vessels. The existing legislation is contained in the Merchant Shipping Act of 1854, sections 131 to 140, and in the Merchant Shipping Act of 1862, sections 5 to 12. From 1854 to 1862 the system of granting certificates to masters and mates had worked so well that in the Act of 1862 provision was made to extend the system to first and second class engineers, and in the United Kingdom the system is considered so conducive to safety, that the enactments of 1883 and 1887 of the Imperial Parliament contain provisions requiring the skippers and second hands of trawlers of 25 tons and upwards to be examined and hold certificates of competency and representative bodies in the United Kingdom have quite recently urged the Board of Trade to raise the standard of examinations, and to extend the system to other classes of seamen.

Previous to 1870 much difficulty had been experienced by masters and mates of vessels registered in Canada, from the fact that the Imperial Merchant Shipping laws required them to have certificates of competency when clearing from a port in the United Kingdom to any port in the world other than a port in Canada. This necessitated the master either giving up his ship or passing an examination before the Imperial Boards of examiners or evading the law by hiring a certificated master and mate to clear the ship and then sailing without them. There were no facilities at that time in Canada, by which masters and mates or engineers could obtain Canadian certificates which would be valid in the United Kingdom.

The matter was brought to the notice of the Imperial Board of Trade by this department, and in 1869, the Imperial Parliament passed the following enactment, viz. :—

Where the legislature of any British possession provides for the examination of, and granting of certificates of competency to persons intending to act as masters, mates, or engineers on board British ships, and the Board of Trade reports to Her Majesty that they are satisfied that the examinations are so conducted as to be equally efficient as the examinations for the same purpose in the United Kingdom under the Acts relating to merchant shipping, and that the certificates are granted on such principles as to show the like qualifications and competency as those granted under the said Acts, and are liable to be forfeited for the like reasons and in the like manner, it shall be lawful for Her Majesty, by Order in Council :—

1. To declare that the said certificates shall be of the same force as if they had been granted under the said Acts.

2. To declare that all or any of the provisions of the said Acts which relate to certificates of competency granted under those Acts shall apply to the certificate referred to in the said order.

3. To impose such conditions and to make such regulations with respect to the said certificate, and to the use, issue, delivery, cancellation, and suspension thereof, as to Her Majesty may seem fit, and to impose penalties not exceeding fifty pounds for the breach of such condition and regulations.

Upon the publication in the *London Gazette* of any such Order in Council as last aforesaid, the provisions therein contained shall, from a date to be mentioned for the purpose in such order, take effect as if they had been contained in this Act.

It shall be lawful for Her Majesty in Council to revoke any order made under this section.

In 1870, the Canadian Parliament passed the Act known as the Act respecting certificates to masters and mates of ships. It rendered it imperative for masters and mates clearing a Canadian registered ship over 150 tons registered tonnage for sea-going voyages to hold valid certificates of competency or service. Examiners were appointed and the law put in operation on the 1st January, 1871. Steps were taken to assure the Board of Trade, that the examinations in Canada would be so conducted as to be equally efficient with the examination for the same purpose in the United Kingdom, and Her Majesty issued an Order in Council, declaring Canadian certificates of competency to be of the same force as if they had been granted by the Board of Trade. This Act did not interfere with masters and mates going on coasting voyages to the United States or to Newfoundland.

This system has been found to be—apart from the question of greater safety—of great advantage to ship masters, as Canadian certificates of competency are not only valid in the United Kingdom but are also valid in any British Possessions.

The following British Possessions adopted the Imperial system in regard to certificated masters, mates and engineers, viz.:—

Canada, masters and mates in.....	1871
do 1st and 2nd engineers.....	1887
Malta, masters, mates and engineers in.....	1874
Victoria do do	1870
New Zealand do do	1872
New South Wales, masters and mates and 1st and 2nd engineers in	1872
South Australia, masters and mates and 1st and 2nd engineers.....	1874
Tasmania, master, mates and engineers.....	1876
Bengal do do	1876
Newfoundland, masters and mates.....	1877
Bombay, masters, mates and engineers.....	1877
Queensland do do	1877
Hong Kong do do	1884
Straits Settlements, 1st and 2nd engineers.....	1888
do masters and mates	1890
Mauritius do	1891

INLAND AND COASTING CERTIFICATES.

The numerous disasters to shipping engaged in the coasting trade and to vessels plying on the inland waters of the Dominion, and the unprecedented loss of life which occurred in connection with disasters to shipping during *1881 and 1882, on the inland waters, brought into prominence the question whether for the greater protection of life and property, a system similar to that which prevailed in regard to masters and mates making sea voyages, should be applied to masters and mates engaged in the coasting trade or navigating the inland waters, and whether there was an uncalled for risk to life and property in vessels to be commanded by men whose qualifications had not been tested by some competent tribunal, and it was pointed out during the discussion which ensued on the introduction of the Bill in Parliament, that in other occupations in life where the safety of life and property is involved, men who occupy positions of trust are called upon to show whether they possess the qualifications necessary for the proper discharge of the duties devolving upon them. An act was accordingly passed by the Dominion Parliament during the session of 1883. Examiners were appointed and rules prepared of a much lower standard than the rules fixing the qualifications of masters in making deep-sea voyages, and examinations held at different ports to suit the convenience of applicants, and the Act was finally put in operation on the 1st January, 1884. Under the provisions of this Act, every sailing ship registered in Canada over one hundred tons register tonnage, requires to have a certificated master, and also requires a certificated mate if over two hundred tons register tonnage, and every steamship registered in Canada, of whatever tonnage requires to have a certificated master, and every steam-

*In 1881, 249 lives were lost. In 1882, 116 lives were lost.

ship registered in Canada, and allowed by law to carry more than forty passengers, must have a certificated mate in addition to a certificated master. These provisions, however, do not apply to pleasure yachts not carrying passengers or goods for hire or to ships employed solely in fishing, or to barges or other vessels having neither masts, sails or rigging and not being steamships.

Under the Act referred to 2,745 certificates have been issued up to 31st December last. Of that number 1,443 were service certificates and 1,302 were competency.

In addition to issuing certificates to masters and mates of sea-going ships, the Imperial Board of Trade issues certificates to masters and mates and to "Home-trade ships." These certificates correspond to some extent to the Canadian coasting certificates, but are much more restricted in their geographical boundaries. The Imperial home trade certificate is limited to the coast of the United Kingdom, the Islands of Guernsey, Jersey, Sark, Alderney and Man and the continent of Europe between the river Elbe and Brest inclusive. The Canadian coasting certificate extends to the United States of America to the West Indian Islands and to the east coast of South America. Previous to the existing legislation in regard to coasting voyages, masters and mates of vessels over 150 tons register making voyages to the West Indian Islands or to South or Central America, required to possess certificates for sea-going voyages under the provisions of the Act of 1870. Under the Act of 1883, the certificates are divided into three classes, viz.:—Certificates for the coasting trade, and certificates for navigating the great inland waters and certificates for navigating the minor inland waters, and these three classes are subdivided by certificates for "square rigged" vessel, "fore and aft rigged" vessel, for "steam tug," "freight steamboats," "steam ferries," and "passenger steamboats."

In 1886, arrangements were entered into and legislation effected whereby Canadian certificates to 1st and 2nd class engineers, who pass an examination as efficient as examinations in the United Kingdom for the same purpose, are valid in Great Britain or any British possession, and certificates to 1st and 2nd class engineers issued by the Imperial Board of Trade became valid in Canada.

An official inquiry into a casualty which occurred to the steamer "Rustler" on the Miramichi River, in September last, led to the discovery that at the ports of Newcastle, Chatham and St. John, certain tug-boats and steam ferry boats had been allowed to run without certificated masters, although the law which requires such vessels to carry certificated masters had been in operation since 1st January, 1884. Further inquiry revealed the fact that in October last, in the St. John district, 33 steamboats—principally tug-boats although ferry boats and passenger boats were included—were running without certificated masters.

Capt. Thomas, the local examiner at St. John, was sent to Miramichi for the accommodation of applicants for certificates at that point. A number of the masters at St. John received certificates of service. Others passed the examination and received certificates of competency, and so far as the department is aware all the steamboats in the St. John district have complied with the law.

In May last, a court of inquiry was held at New Providence, one of the Bahama Islands to inquire into the circumstances attending the stranding of the schr. "Topaz," of Liverpool, N.S., on the Bahama bank, on the 6th of May, 1893, a copy of the opinion of the court follows, and it will be seen that the disaster was attributed to the incompetency of the mate who had charge of the vessel. The mate was not a certificated officer.

OPINION OF THE COURT.

"I am of the opinion that the disaster which befell the schr. "Topaz" as above described must be attributed to the incompetency of the mate, who, owing to the master's illness, had been in charge of the vessel for several days. This man admits that he is not a navigator, and the working of the vessel through a difficult passage was attempted to be effected by him merely by dead reckoning and his own judgment. On the 5th May, at noon, he supposed himself to be in Lat. 24° 25' N. and Long. 80° 25' W., and he hoped by steering E.N.E. to get to the centre of the Straits of Florida and then to steer north. This is his own explanation. On the 6th May, with a fair wind and in broad daylight he found his vessel in soundings and although he had been steering E.N.E. for nearly 24 hours, he still supposed the vessel to be on the Florida shore. It seems an almost incredible blunder, and I drew the mate's attention to it, after carefully re-examining him. I feel satisfied, however, that it was an error in judgment of a man who unfortunately was placed in a position for which he was incapacitated."

(Signed) JAS. M. RAE,
S. & C. Magistrate.

Up to the 31st December, 1893, 3,065 sea-going certificates of competency and 1,443 of service have been issued to masters and mates, and up to the same date, 1,302 certificates of competency and 2,955 certificates of service have been issued to masters and mates engaged in the coasting trade and in navigating the inland waters. Statements in detail follow, showing the ports at which candidates passed and the description of vessel for which they obtained certificates.

STATEMENT of Sea-going Certificates of Competency issued to Masters and Mates of from 1871 to 1893, both years included, at different Ports in the Dominion.

	Victoria.		Halifax.		St. John.		Quebec.		Yarmouth.		Charlottetown.	
	Master.	Mate.	Master.	Mate.	Master.	Mate.	Master.	Mate.	Master.	Mate.	Master.	Mate.
1871					25	5						
1872			63	1	113	8	24					
1873			48	2	73	5	4					
1874			61	12	83	11	5					
1875			53	15	70	11	7	2				
1876			35	24	53	24	10				5	
1877			24	18	48	29	3	6			13	3
1878	(Ottawa	1)	28	14	30	18	4	10	12	5	9	
1879			16	18	22	22	3	4	21	17	4	4
1880			24	29	16	25	8	4	23	24	4	4
1881			19	33	19	25	4	5	27	16	4	1
1882			32	25	17	20	2	4	8	22		
1883			35	37	33	30	3	4	16	24		
1884			18	32	19	25	2		12	18	1	1
1885			25	36	19	25	3	6	17	17		
1886			34	31	20	18	5	3	26	16		
1887			19	33	18	20	3	3	17	17		
1888			24	18	14	28	2	12	14	9		
1889	1		27	23	17	16	11	5	16	10		
1890			26	26	17	16	2	1	8	9		
1891	3	2	22	20	30	13	1	5	5	16		
1892	3	2	16	16	8	11	4		20	8		
1893	1	1	16	10	11	15		3	5	6		
	8	5	665	473	775	420	110	75	247	234	40	13

NOTE.—A large number of the mates' certificates have been cancelled, as the holders have passed for higher grade.

STATEMENT of Masters and Mates' Certificates of Competency, Coasting,

NOTE.—Many of the certificates are dual certificates, permitting the holders to sail in steamers and tugs as the numbers run consecutively; the classification shows the kind

COMPETENCY,

Place at which examination was held.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Yarmouth.....	1 master, F. and A., coasting.					

COMPETENCY,

Cobourg.....			1 master, square rig, inland.			
Collingwood.....					4 masters, steamers, inland.	1 mate, str., inland.
Georgeville, Que.....						
Halifax.....	1 master, F. and A., coasting.					
Kingston.....			2 masters, F. and A., inland.			
Ottawa.....						
Owen Sound.....					1 master, steamer, inland.	2 mates, str., inland.
Peterborough.....			1 master, square rig, inland.			
Picton, Ont.....			1 master, F. and A., inland.			
Prescott.....						1 mate, str., inland.
Quebec.....	1 master, steamer, coasting.				1 master, steamer, inland.	
Sydney, C.B.....	do do					
do.....	8 masters, square rig, coasting.					
St. Catharines.....			3 masters, F. and A., inland.	1 mate, F. and A., inland.	9 masters, steamers, inland.	do do
St. John.....	14 masters, F. and A., coasting.				1 master, steamer, inland.	
do.....	1 master, steamer, coasting.					
do.....	2 masters, square rig, coasting.					
Toronto.....			2 masters, F. and A., inland.		7 masters, steamers, inland.	

Inland and Minor Inland, issued from 1883 to 1893, both years included.

well as sailing vessels ; each certificate that has been issued has its own number, whether dual or not, and of vessels in which the holders of certificates are allowed to serve.

1883.

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.

1884.

		1 master, str., minor inland.					
		2 masters, strs., minor inland.					
		1 master, str., minor inland.					
		1 master, str., minor inland.					

STATEMENT of Masters and Mates' Certificates of Competency, Coasting, Inland
COMPETENCY

Place at which examination was held.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Victoria.....	3 masters, steamers, coasting.	1 mate, str., coasting.				
Windsor.....			1 master, F. and A., inland.		2 masters, steamers, inland.	
Yarmouth.....	2 masters, square rig, coasting.					

COMPETENCY.

Kingston.....			2 masters, F. and A., inland.		3 masters, steamers, inland.	
Montreal						
Ottawa.....						2 mates, str., inland.
Owen Sound.....			2 masters, F. and A., inland.	1 mate, F. and A., in- land.	1 master, steamer, inland.	1 mate, str., inland.
Quebec.....					do do	
St. Catharines.....			6 masters, F. and A., inland.		6 masters, steamers, inland.	2 mates, str., inland.
St. John.....	3 masters, F. and A., coasting.					
Sydney.....	1 master, F. and A., coasting.					
do.....	2 masters, square rig, coasting.	1 mate, sq'are rig, coast- ing.				
Toronto.....					10 masters, steamers, inland.	3 mates, str. inland.
Victoria.....		1 mate, str., coasting.				
Yarmouth.....	1 master, square rig, coasting.					

COMPETENCY

Arichat.....	7 masters, F. and A., coasting.					
do.....	4 masters, square rig, coasting.	1 mate, sq'are rig, coast- ing.				
Kingston.....			2 masters, F. and A., inland.			1 mate, str. inland.
Lunenburg.....	1 master, square rig, coasting.					
do.....	1 master, F. and A., coasting.					

REPORT OF THE DEPUTY MINISTER.

11

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*

1884—*Concluded.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.

1885.

		1 master, str., minor inland. do do	1 mate, str., minor inland. 1 mate, str., minor inland. do do				
1 master, steam tug, inland.		3 masters, str., minor inland.					
		1 master, str., minor inland.					

1886.

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**STATEMENT of Masters and Mates' Certificates of Competency, Coasting, Inland
COMPETENCY,**

Place at which examination was held.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Montreal.....						do do
Owen Sound.....			1 master, F. and A., inland.		1 master, steamer, inland.	
Quebec.....		1 mate, sq'are rig, coast- ing.				
St. Catharines.....		1 mate, F. and A., coasting. do do	do do		3 masters, steamers, inland.	
St. John.....	3 masters, F. and A., coasting.					
do.....	1 master, steamer, coasting.					
do.....	1 master, square rig, coasting.					
Sydney.....	1 master, F. and A., coasting.					
do.....	1 master, square rig, coasting.					
Toronto.....			3 masters, F. and A., inland.	1 mate, F. and A., inland.	4 masters, steamers, inland.	4 mates, str., inland.
Victoria.....	1 master, steamer, coasting.	1 mate, str., coasting.				
Yarmouth.....	2 masters, F. and A., coasting.					

COMPETENCY,

Kingston.....			2 masters, F. and A., inland.		1 master, steamer, inland.	
Lunenburg.....	6 masters, F. and A., coasting.					
do.....	1 master, square rig, coasting.					
Ottawa.....					do do	1 mate, str., inland.
Quebec.....	1 master, square rig, coasting.				do do	
St. Catharines.....			2 masters, F. and A., inland.	3 mates, F., and A., inland. 1 mate, sq'are rig, inland.	9 masters, steamers, inland.	2 mates, str., inland.
St. John.....	5 masters, F. and A., coasting.					

**STATEMENT of Masters and Mates' Certificates of Competency, Coasting, Inland
COMPETENCY**

Place at which examination was held.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
St. John.....	1 master, steam tug, coasting.					
do	1 master, steamer, coasting.					
do	2 masters, square rig, coasting.					
Sydney.....	3 masters, square rig, coasting.					
Toronto.....			5 masters, F. and A., inland.		2 masters, steamers, inland.	5 mates, str., inland.
Victoria.....	1 master, square rig, coasting.					
Yarmouth.....	1 master, F. and A., coasting.					

COMPETENCY,

Halifax	1 master, F. and A., coasting.					
Kingston			2 masters, F. and A., inland.			
Lunenburg.....	2 masters, F. and A., coasting.					
do	1 master, square rig, coasting.					
Ottawa					2 masters, steamers, inland.	
Quebec.....						
St. Catharines			10 masters, F. and A., inland.	1 mate, F. and A., in- land.	9 masters, steamers, inland.	4 mates, steamers, inland.
do						
St. John.....	7 masters, F. and A., coasting.					
do	2 masters, square rig, coasting.					2 mates, steamers, inland.
Sydney	3 masters, square rig, coasting.	1 mate, square rig, coast- ing.				
do	3 masters, F. and A., coasting.					
Toronto			2 masters, F. and A., inland.	2 mates, F. and A., in- land.	2 masters, freight str., inland.	

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*

1887—*Concluded.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
		1 master, str., minor inland.					
		3 masters, str., minor inland.				1 master, st. tug, minor inland.	

1888.

		1 master, str., minor inland.	2 mates, str., minor inland.				
		do					
		do	2 mates, str., minor inland.				
1 master, steam tug, inland. do		4 masters, str., minor inland.	4 mates, str., minor inland.			1 master, st. tug, minor inland.	
		2 masters, str., minor inland.	1 mate, str., minor inland.				
			2 mates, str., minor inland.				
		2 masters, str., minor inland.				1 master, st. tug, minor inland.	

**STATEMENT of Masters and Mates' Certificates of Competency, Coasting, Inland
COMPETENCY.**

Place at which examination was held.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Toronto.....					4 masters, steamers, inland.	1 mate, str., inland.
Victoria.....	1 master, steamer, coasting.					
Yarmouth.....	1 master, square rig, coasting.					

COMPETENCY.

Halifax.....	1 master, F. and A., coasting.					
Kingston.....			4 masters, F. and A., inland.	6 mates, F. and A., in- land.	1 master, frt. steamer, inland.	2 mates, str. inland.
Lunenburg.....	1 master, square rig, coasting.	1 mate, square rig, coast- ing.				
do.....		1 mate, F. and A., coasting.				
Ottawa.....					2 masters, steamer, inland.	
St. Catharines.....			3 masters, F. and A., inland.	8 mates, F. and A., in- land.	7 masters, steamer, inland.	8 mates, frt. steamer, inland.
do.....					3 masters, frt. str., inland.	
St. John.....	21 masters, F. and A., coasting.					
do.....	2 masters, square rig, coasting.	1 mate, str., coasting.				
Sydney.....	1 master square rig, coasting.					
Toronto.....			1 master, F. and A., inland.		7 masters, steamer, inland.	3 mates, str., inland.
Victoria.....	2 masters, steamer, coasting.					

COMPETENCY.

Halifax.....	5 masters, F. and A., coasting.	2 mates, F. and A., coasting.				
Kingston.....						1 mate, str. inland.
Lunenburg.....	1 master, F. and A., coasting.					

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*1888—*Concluded.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
		1 master, str., minor inland.					

1889.

		1 master, str., minor inland.	2 mates, str., minor inland.				
		8 masters, str., minor inland.	do			1 master, st. tug, minor inland.	
1 master, steam tug, inland.		3 masters, frt. str., minor inland.	3 mates, str., minor inland.			3 masters, st. tug, minor inland.	
		3 masters, pass. str., m'or. inland	do				
1 master, steam tug, inland.		1 master, str., minor inland.				1 master, st. tug, minor inland.	

1890.

1 master, steam tug, inland.							
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**STATEMENT of Masters and Mates' Certificates of Competency, Coasting, Inland
COMPETENCY,**

Place at which examination was held.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Ottawa				2 mates, F. and A., inland.	3 masters, steamers, inland.	
Quebec	3 masters, F. and A., coasting.		1 master, F. and A., inland.			
St. Catharines			11 masters, F. and A., inland.	5 mates, F. and A., inland.	28 masters, frt. str., inland.	13 mates, steamers, inland.
St. John	16 masters, F. and A., coasting.	1 mate, F. and A., coasting.			1 master, steamer, inland.	
do	5 masters, square rig, coasting.					
Sydney	2 masters, square rig, coasting.					
Toronto			1 master, F. and A., inland.	1 mate, F. and A., inland.	2 masters, steamer, inland.	1 mate, str., inland.
Victoria	6 masters, steamers coasting.					
do	1 master, F. and A., coasting.	2 mates, F. and A., coasting.				
Yarmouth	2 masters, square rig, coasting.					

COMPETENCY,

Gravenhurst						1 mate, str., inland.
Halifax	1 master, F. and A., coasting.					
Kingston			1 master, F. and A., inland.	2 mates, F. and A., inland.	5 masters, steamers, inland.	3 mates, str., inland.
Lunenburg	3 masters, F. and A., coasting.	1 mate, square rig, coast- ing.				
Ottawa					1 master, frt. str., inland.	1 mate, str., inland.
Quebec					2 masters, steamers, inland.	
Southampton						
St. Catharines			11 masters, F. and A., inland.	8 mates, F. and A., inland.	45 masters, steamers, inland.	19 mates, steamers, inland.
do						

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*

1890—*Concluded.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
		2 masters, stra., minor inland.					
		3 masters, stra., minor inland.	1 mate, str., minor in- land.				
4 masters, steam tug, inland.		2 masters, stra., minor inland.	4 mates, str., minor in- land.				
			1 mate, str., minor in- land.				
		1 master, str., minor inland.					

1891.

		2 masters, stra., minor inland.	1 mate, str., minor in- land.				
		2 masters, stra., minor inland.					
						1 master, steam tug, minor in- land.	
1 master, steam tug, inland.		5 masters, stra., minor inland.	1 mate, str., minor in- land.			3 masters, steam tugs, minor in- land.	2 mates, steam tugs, minor in- land.
2 masters, steam tug, inland.							

**STATEMENT of Masters and Mates' Certificates of Competency, Coasting, Inland
COMPETENCY.**

Place at which examination was held.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
St. John.....	16 masters, F. and A., coasting.	4 mates, F. and A., coasting.			4 masters, steamers, inland,	1 mate, str., inland.
do	1 master, steamer, coasting.					
do	3 masters, square rig, coasting.					
Sydney	1 master, square rig, coasting.				1 master, steamer, inland.	
do	5 masters, F. and A., coasting.					
Toronto.....			1 master, F. and A., inland.		2 masters, steamer, inland.	6 mates, str., inland.
Vancouver.....	1 master, steamer, coasting.					
Victoria	2 masters, steamer, coasting.	6 mates, str., coasting.			1 master, steamer, inland.	
do	1 master, F. and A., coasting.	6 mates, F. and A., coasting.				

COMPETENCY.

Guysboro'.....	1 master, F. and A., coasting.					
Halifax.....	1 master, F. and A., coasting.					
do	2 masters, square rig, coasting.					
Kingston.....			1 master, F. and A., inland.	2 mates, F. and A., in- land.	1 master, pass. str., inland.	2 mates, pass. steamers, inland.
Lockeport	1 master, square rig,					
Lunenburg.....	4 masters, square rig, coasting.					
Ottawa						
Quebec.....	1 master, passenger steamer.					
do	1 master, F. and A., coasting.					
Rat Portage.....						

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*

1891—*Concluded.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
		1 master, str., minor inland.					

1892.

		3 masters, pass. strs., minor in- land.	3 mates, pass. strs., minor inland.				
		5 masters, pass. strs., minor in- land.	2 mates, pass. strs., minor inland.				
		1 master, pass. str., minor inland.	do do	1 master, F. and A., minor in- land.			
		1 master, pass. str., minor inland.				2 masters, steam tugs, minor in- land	

**STATEMENT of Masters and Mates' Certificates of Competency, Coasting, Inland
COMPETENCY,**

Place at which examination was held.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Sydney	4 masters, square rig, coasting.					
do	5 masters, F. and A., coasting.					
St. Catharines			4 masters, F. and A., inland.	3 mates, F. and A., inland.	8 masters, pass. str., inland.	2 mates, frgt. steamers, inland.
do					7 masters, frgt. str., inland.	5 mates, pass. steamers, inland.
St. John	11 masters, square rig, coasting.	2 mates, sq're rig, coasting.				
do	4 masters, F. and A., coasting.	3 mates, F. and A., coasting.				
do		1 mate, pass. steamer, coasting.				
Toronto			1 master, F. and A., inland.		2 masters, pass. str., inland.	4 mates, pass. steamers, inland.
Vancouver	1 master, F. and A., coasting.					
Victoria	4 masters, pass. str., coasting.	1 mate, sq're rig, coasting.				
do	1 master, F. and A., coasting.	6 mates, F. and A., coasting.				
do		4 mates, pass. steamer, coasting.				
do		1 mate, str., coasting.				
Yarmouth	1 master, square rig, coasting.	2 mates, F. and A., coasting.				
do		1 mate, sq're rig, coasting.				

COMPETENCY,

Chatham, N.B.						
Halifax	4 masters, square rig, coasting.					
do	4 masters, F. and A., coasting.	1 mate, F. and A., coasting.				

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*1892—*Concluded.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
4 masters, steam tugs, inland.	1 mate, steam tug, in- land.	4 masters, freight strs., minor in- land.				3 masters, steam tugs, minor in- land.	
1 master, steam tug, inland.		6 masters, pass. strs., minor in- land.	4 mates, pass. strs., minor inland.			do do	
		2 masters, pass. strs., minor in- land.	do do				
		4 masters, pass. strs., minor in- land.					
			1 mate, pass. str., minor inland.				

1893.

		2 masters, strs., minor inland.	1 mate, str., minor in- land.			1 master, st. tug, minor inland.	
		1 master, pass. str., minor inland.	1 mate, pass. str., minor inland.				

STATEMENT of Masters and Mates' Certificates of Competency, Coasting, Inland
COMPETENCY,

Place at which examination was held.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Kingston.			3 masters, F. and A., inland.	1 mate, F. and A., in- land.	2 masters, pass. str., inland.	
Lunenburg.	2 masters, square rig, coasting.	3 mates, sq're rig, coast- ing.				
Ottawa					1 master, pass. str., inland.	
Quebec.		3 mates, sq're rig, coast- ing.				
Rat Portage.						
Sorel, P. Q.						
Sydney	3 masters, F. and A., coasting.					
St. Catharines.			9 masters, F. and A., inland.	6 mates, F. and A., in- land.	5 masters, freight str., inland	7 mates, frt. stra., in- land.
do				1 mate, sq're rig, inland.	6 masters, pass. str., inland.	6 mates, pass. stra., in- land.
do						
St. John.	11 masters, square rig, coasting.	4 mates, sq're rig, coast- ing.				1 mate, pass. str., inland
do	20 masters, F. and A., coasting.	3 mates, F. and A., coasting.				
Toronto.					1 master, pass. str., inland.	2 mates, pass. stra., in- land.
do						1 mate, frt. str., in- land.
Victoria	5 masters, pass. str., coasting.	5 mates, sq're rig, coast- ing.				1 mate, pass. str., in- land.
do	1 master, square rig, coasting.	4 mates, F. and A., coasting.				
do	1 master, F. and A., coasting.	4 mates, pass. str., coast- ing.				

and Minor Inland, issued from 1883 to 1893, both years included—*Concluded.*

1893—*Concluded.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
		3 masters, pass. str., minor inland.	8 mates, pass. str., minor inland.				
		9 masters, pass. str., minor inland.	2 mates, pass. str., minor inland.			2 masters, st. tugs, minor inland.	1 mate, st. tug, minor inland.
		5 masters, pass. str., minor inland.	3 mates, pass. str., minor inland.	3 masters, F. and A., minor inland.		1 master, st. tug, minor inland.	
		1 master, pass. str., minor inland.	1 mate, pass. str., minor inland.				
		4 masters, pass. str., minor inland.				1 master, st. tug, minor inland.	
		3 masters, pass. str., minor inland.		2 masters, F. and A., minor inland.		do do	
		7 masters, pass. str., minor inland.	1 mate, pass. str., minor inland.			2 masters, st. tugs, minor inland.	
1 master, steam tug, inland.		1 master, frt. str., minor inland.				6 masters, st. tugs, minor inland.	
8 masters, steam tugs, inland.							
		6 masters, pass. str., minor inland.	2 mates, pass. str., minor inland.			11 masters, st. tugs, minor inland.	
		1 master, pass. str., minor inland.					
		2 masters, pass. str., minor inland.					

STATEMENT of Masters' and Mates' Certificates of Service, Coasting,
SERVICE,

Place at which Examination was passed.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Halifax	12 masters, F. and A., coasting.					
St. John, N.B.	17 masters, F. and A., coasting.	1 mate, F. and A., coasting.				
Yarmouth	4 masters, F. and A., coasting.	do do				

SERVICE,

Annapolis	4 masters, F. and A., coasting.					
do	1 master square rig, coasting.					
Arichat	8 masters, F. and A., coasting.	5 mates, square rig, coasting.				
do	7 masters, square rig, coasting.					
Beauharnois						8 mates, steamers, inland.
Brighton, Ont.			1 master, F. and A., inland.			
Charlottetown	1 master, steamer, coasting.	3 mates, steamers, coasting.				
do	4 masters, F. and A., coasting.	1 mate, F. and A., coasting.				
do	1 master, square rig, coasting.	1 mate, square rig, coast- ing.				
Cobourg			3 masters, F. and A., inland.	4 mates, F. and A., in- land.		
Collingwood			2 masters, F. and A., inland.	4 mates, F. and A., in- land.	8 masters, steamers, inland.	4 mates, steamers, inland.
Cornwallis	3 masters, F. and A., coasting.	1 mate, F. and A., coasting.				
Georgeville, Q.						
Goderich			14 masters, F. and A., inland.	5 mates, F. and A., inland.	11 masters, steamers, inland.	1 mate, str., inland.
Halifax	121 masters, F. and A., coasting.	7 mates, F. and A., coasting.				1 mate, str., inland.
do	3 masters, steamers, coasting.	1 mate, str., coasting.				
do	19 masters, square rig, coasting.	7 mates, square rig, coast- ing.				

Inland and Minor Inland, issued from 1883 to 1893, both years included.

1883.

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.

1884.

		5 masters, strs., minor inland.	2 mates, strs., minor inland.				
		3 masters, strs., minor inland.	2 mates, strs., minor inland.				
1 master, steam tug, inland.		14 masters, strs., minor inland.	1 mate, str., minor in- land.				
			do do				
		4 masters, strs., minor inland.					
		masters, strs., minor inland.					

**STATEMENT of Masters' and Mates' Certificates of Service, Coasting, Inland
SERVICE,**

Place at which Examination was passed.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Kincardine			2 masters, F. and A., inland.			
Kingston	1 master, F. and A., coasting.		58 masters, F. and A., inland.	27 mates, F. and A., inland.	19 masters, steamers, inland.	20 mates, steamers, inland.
Lunenburg	37 masters, F. and A., coasting.	2 mates, F. and A., coasting.				
do	2 masters, square rig, coasting.					
Liverpool	5 masters, F. and A., coasting.					
do	1 master, square rig, coasting.					
Lindsay				1 mate, square rig, inland.		
Montreal					6 masters, steamers, inland.	4 mates, steamers, inland.
New Carlisle.....	16 masters, F. and A., coasting.	3 mates, square rig, coast- ing.				
do	1 master, square rig, coasting.					
Owen Sound.....			3 masters, F. and A., inland.	4 mates, F. and A., inland.	13 masters, steamers, inland.	1 mate, str., inland.
Ottawa.....			1 master, F. and A., inland.	1 mate, F. and A., inland.	2 masters, steamers, inland.	do do .
Parrsboro'.....	11 masters, F. and A., coasting.	8 mates, F. and A., coasting.				
do	2 masters, square rig, coasting.					
Penetanguishene						
Peterboro'.....						
Picton, Ont.			26 masters, F. and A., inland.	8 mates, F. and A., inland.	2 masters, steamers, inland.	2 mates, steamers, inland.
Pictou, N.S.	3 masters, F. and A., coasting.					
Prescott.....						5 mates, steamers, inland.
Port Arthur.....			3 masters, F. and A., inland.	1 mate, F. and A., inland.	4 masters, steamers, inland.	
Port Colborne.....			1 master, F. and A., inland.			

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*1894—*Continued.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mate.	Masters.	Mates.
3 masters, steam tug, inland.		34 masters, stra., minor inland.	4 mates, stra., minor inland.				
		1 master, str., minor inland.					
		60 masters, stra., minor inland.	24 mates, stra., minor inland.	17 masters, F. and A., minor in- land.			
		1 master, str., minor in- land.					
1 master, steam tug, inland.		61 masters, stra., minor inland.	5 mates, stra., minor inland.				
		1 master, str., minor in- land.					
		2 masters, stra., minor inland.	1 mate, str., minor in- land.				
		6 masters, stra., minor inland.	2 mates, str., minor in- land.				
			1 mate, str., minor in- land.				
			12 mates, stra., minor inland.				
		1 master, str., minor in- land.					

**STATEMENT of Masters' and Mates' Certificates of Service, Coasting, Inland
SERVICE,**

Place at which Examination was passed.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Port Dover						
Port Hope.....			49 masters, F. and A., inland.	26 mates, F. and A., inland.	4 masters, steamers, inland.	
Quebec	22 masters, steamers, coasting.	3 mates, square rig, coast- ing.	1 master, F. and A., inland.			
do	67 masters, F. and A., coasting.	9 mates, F. and A., coasting.				
do	10 masters, square rig, coasting.	11 mates, steamers, coasting.				
Rimouski.....	8 masters, F. and A., coasting.					
Sarnia.....			20 masters, F. and A., inland.	4 mates, F. and A., inland.	14 masters, steamers, inland.	5 mates, steamers, inland.
Shelburne.....	2 masters, F. and A., coasting.					
Sorel, P.Q.						
Sydney, C.B.	24 masters, F. and A., coasting.	2 mates, F. and A., coasting.				
do	2 masters, square rig, coasting.					
do	1 master, steamer, coasting.					
St. Catharines ..			58 masters, F. and A., inland.	27 mates, F. and A., inland.	17 masters, steamers, inland.	5 mates, steamers, inland.
do			1 master, square rig, inland.			
St. John	123 masters, F. and A., coasting.	4 mates, F. and A., inland.				
do	9 masters, steamers, coasting.	1 mate, str., coasting.				
do		1 mate, square rig, coast- ing.				
Three Rivers	1 master, F. and A., coasting.					
Toronto			67 masters, F. and A., inland.	28 mates, F. and A., inland.	31 masters, steamers, inland.	11 mates, steamers, inland.
do			8 masters, square rig, inland.	1 mate, square rig, inland.		
Victoria, B.C.	27 masters, steamers, coasting.	5 mates, steamers, coasting.			5 masters, steamers, inland.	2 mates, steamers, inland.

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*1884—*Continued.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
		1 master, str., minor inland.					
		8 masters, minor inland.					
		45 masters, strs., minor inland.	6 mates, strs., minor inland.	31 masters, F. and A., minor inland.			
		21 masters, strs., minor inland.	4 mates, strs., minor inland.				
		19 masters, strs., minor inland.	3 mates, strs., minor inland.	4 mates, F. and A., minor inland.			
		1 master, str., minor inland.					
17 mates, steam tugs, inland.		27 masters, strs., minor inland.	2 mates, strs., minor inland.				
		27 masters, strs., minor inland.	5 mates, strs., minor inland.				
				21 masters, F. and A., minor inland.		1 master, steam tug, minor inland.	
1 master, steam tug, inland.		40 masters, strs., minor inland.	16 mates, strs., minor inland.			1 master, steam tug, minor inland.	
		2 masters, strs., minor inland.					

STATEMENT of Masters' and Mates' Certificates of Service, Coasting, Inland
SERVICE.

Place at which Examination was passed.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Victoria, B.C.	1 master, F. and A., coasting.					
Weymouth	3 masters, F. and A., coasting.					
Windsor			10 masters, F. and A., inland.	5 mates, F. and A., in- land.	9 masters, steamers, inland.	3 mates, steamers, inland.
Yarmouth.	17 masters, F. and A., coasting.	1 mate, F. and A., coasting.				
do	6 masters, square rig, coasting.					
do	1 master, steamer, coasting.					

SERVICE.

Arichat,	1 master, square rig, coasting.					
do	1 master, F. and A., coasting.					
Antigonish	do do					
Deseronto				1 mate, F. and A., inland.		
Halifax,	14 masters, F. and A., coasting.					
do	2 masters, square rig, coasting.					
Kingston.			2 masters, F. and A., inland.		1 master, steamer, inland.	
Liverpool	1 master, F. and A., coasting.					
Lunenburg	do do					
Montreal			1 master, F. and A., inland.			1 mate, str., inland.
New Carlisle.	1 master, F. and A., coasting.					
Ottawa						1 mate, str., inland.
Owen Sound				1 mate, F. and A., inland.	1 master, steamer, inland.	

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*1884—*Concluded.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
		21 masters, stra., minor inland.	8 mates, stra., minor inland.				

1885.

		2 masters, stra., minor inland.					
		2 masters, stra., minor inland.					
		1 master, str., minor in- land.	1 mate, str., minor in- land.				
		8 masters, stra., minor inland.	1 mate, str., minor in- land.			1 master, steam tug, minor in- land.	

STATEMENT of Masters' and Mates' Certificates of Service, Coasting, Inland
SERVICE.

Place at which Examination was passed.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Pictou, N.S.						
Port Hope.				1 mate, F. and A., inland.		
Port Arthur.					1 master, steamer, inland.	
Farrsboro'.	1 master, F. and A., coasting.	1 mate, F. and A., coasting.				
do		1 mate, sq are rig, coast- ing.				
Parry Sound.				1 mate, F. and A., inland. do do		
Pictou, Ont.						
Quebec	1 master, F. and A., coasting. do do					
Shelburne, N.S.						
Sarnia.						1 mate, str., inland.
Sydney, C.B.	1 master, F. and A., coasting.					
St. Catharines	3 masters, F. and A., coasting.	1 mate, F. and A., coasting.	2 masters, F. and A., inland.	6 mates, F. and A., in- land.	3 masters, steamer, inland.	
do	1 master, square rig, coasting.			1 mate, sq are rig, inland.		
St. John, N.B.	15 masters, F. and A., coasting.	1 mate, F. and A., str., coasting.				
do	1 master, steamer, coasting.					
St. John's, P. Q.						
Toronto	7 masters, F. and A., coasting.			3 mates, F. and A., in- land.	7 masters, steamers, inland.	1 mate, str., inland.
West Arichat	1 master, F. and A., coasting.					
Windsor			1 master, F. and A., in- land.			1 mate, str., inland.
Victoria	4 masters, steamer, coasting.	2 mates, str., coasting.			1 master, steamer, inland.	
do	2 masters, F. and A., coasting.					

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*1885—*Concluded.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
		1 master, str., minor in- land.					
1 master, steam tug, inland.							
		1 master, str., minor in- land.					
1 master, steam tug, inland.							
		3 masters, strs., minor inland.	1 mate, str., minor in- land.				
		1 master, str., minor in- land.				1 master, steam tug, minor in- land.	
				4 masters, F. and A., mi- nor inland.			
		14 masters, strs., minor inland.					
			1 mate, str., minor in- land.				
		1 master, str., minor inland					

STATEMENT of Masters' and Mates' Certificates of Service, Coasting, Inland
SERVICE.

Place at which Examination was passed.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Amherstburg						
Arichat	3 masters, sq. rig, coast- ing.	1 mate, sq. rig, coast- ing.				
do		1 mate. F. and A., coasting.				
Belleville			1 master, F. and A., inland.			
Brockville						
Cornwallis	1 master, F. and A., coasting.					
Charlottetown	1 master, steamer, coasting.					
do	1 master, sq. rig, coast- ing.					
Halifax	1 master, F. and A., coasting.	1 mate, F. and A., coasting.				
Kingston, Ont.			10 masters, F. and A., inland.	5 mates, F. and A., inland.	1 master, str., inland.	1 mate, str., inland.
Lambert	1 master, F. and A., coasting.					
Montreal						
Ottawa						
Parrsboro'	1 master, F. and A., coasting.	1 mate, F. and A., coasting.				
do		1 mate, sq. rig, coast- ing.				
Pictou, Ont.						
Port Arthur						
Quebec	2 masters, F. and A., coasting.					
Sarnia					1 master, str., inland.	
St. John	9 masters, F. and A., coasting.	2 mates, F. and A., coasting.				1 mate, str., inland.
St. Catharines				2 mates, F. and A., in- land.		

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*
1886.

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
						1 master, st. tug, minor inland.	
		1 master, str., minor inland					
		3 masters, strs., minor inland.					
		5 masters, strs., minor inland.	6 mates, strs., minor in- land.				
		3 masters, strs., minor inland.					
			2 mates, strs., minor inland.				
1 master, st. tug, inland.		3 masters, strs., minor inland.					
						1 master, st. tug, minor inland.	

STATEMENT of Masters' and Mates' Certificates of Service, Coasting, Inland
SERVICE.

Port at which Examination was passed.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Sydney, C.B.	6 masters, F. and A., coasting.					
do	1 master, str., coast- ing.					
Toronto.....			6 masters, F. and A., inland.		1 master, steamer, inland.	1 mate, str., inland.
Victoria, B.C.....	1 master, F. and A., coasting.	1 mate, str., coasting.	1 master, F. and A., inland.			
Windsor.....					1 master, steamer, inland.	
Yarmouth.....	8 masters, F. and A., coasting.					

SERVICE.

Cobourg.....			2 masters, F. and A., inland.			
Goderich			1 master, F. and A., inland.			
Gravenhurst.....						
Halifax.....	3 masters, F. and A., coasting.	1 mate, F. and A., coasting.				
do		1 mate, square rig, coast- ing.				
Kingston.....			5 masters, F. and A., inland.	4 mates, F. and A., inland.	2 masters, steamers, inland.	1 mate, str. inland.
Montreal.....						
Ottawa.....						
Pictou, Ont.....			1 master, F. and A., inland.			
Parrsboro'.....	2 masters, square rig, coasting.					
do	3 masters, F. and A., coasting.					
Port Arthur						
Quebec.....						

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*

1886—*Concluded.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
		5 masters, str., minor inland.					
		1 master, str., minor inland.					
		do do					

1887.

1 master, steam tug, inland.		1 master, str., minor inland.					
		2 masters, str., minor inland.					
		1 master, str., minor inland.					
1 master, steam tug, inland.		3 masters, str., str., minor inland.	1 mate, str., minor in- land.			1 master, steam tug, minor in- land.	
do do							
		1 master, str., minor inland.					

STATEMENT of Masters' and Mates' Certificates of Service, Coasting, Inland SERVICE,

Place at which Examination was passed.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Sydney	1 master, square rig, coasting.					
Shelburne	2 masters, F. and A., coasting.					
St. John	7 masters, F. and A., coasting.	1 mate, F. and A., coasting.				
do	1 master, steamer, coasting.					
do	1 master, square rig, coasting.					
St. Catharines			2 masters, square rig, inland.	3 mates, square rig, inland.	8 masters, steamers, inland.	
do			7 masters, F. and A., inland.	9 mates, F. and A., inland.		
Thorne's Cove	1 master, coasting.					
Toronto			5 masters, F. and A., inland.	3 mates, F. and A., inland.		2 mates, str., inland.
Victoria	1 master, F. and A., coasting.					
do	1 master, steamer, coasting.					
Yarmouth	4 masters, F. and A., coasting.					

SERVICE,

Annapolis	1 master, F. and A., coasting.					
Bellefleur						
Georgetown					1 master, steamer, inland.	
Halifax	9 masters, F. and A., coasting.	1 mate, F. and A., coasting.				
do	2 masters, square rig, coasting.	1 mate, square rig, coasting.				
Kingston			3 masters, F. and A., inland.	1 mate, F. and A., inland.	do	do
Lunenburg	3 masters, F. and A., coasting.					
Liverpool	1 master, F. and A., coasting.					

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*

1887—*Continued.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
3 masters, steam tug, inland.	1 mate, steam tug, inland.	9 masters, strs., minor inland.				1 master, steam tug, minor in- land.	
2 masters, steam tug, inland.		7 masters, strs., minor inland. 2 masters, strs., minor inland.				3 masters, steam tug, minor in- land.	

88.

		1 master, str., minor in- land.					
			1 mate, str., minor in- land.				

STATEMENT of Masters and Mates' Certificates of Service, Coasting, Inland
SERVICE,

Place at which examination was passed.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Montreal						
Ottawa			4 masters, F. and A., inland.		2 masters, steamers, inland.	
Parrsboro'	2 masters, F. and A., coasting.	2 mates, F. and A., coasting.				
do		2 mates, sq're rig, coast- ing.				
Port Hope				1 mate, F. and A., inland.		
Quebec	1 master, F. and A., coasting.					
Shelburne	do	do				
St. Catharines			7 masters, F. and A., inland.	3 mates, F. and A., inland.	4 masters, steamers, inland.	2 mates, str., inland.
St. John	9 masters, F. and A., coasting.				1 master, steamer, inland.	
Toronto			5 masters, F. and A., inland.	1 mate, F. and A., inland.	3 masters, steamers, inland.	1 mate, str., inland.
Victoria, B.C.					1 master, steamer, inland.	
Yarmouth	2 masters, F. and A., coasting.					
do	1 master, square rig, coasting.					
Moodyville						

SERVICE,

Barrington	1 master, F. and A., coasting.					
Halifax	2 masters, square rig, coasting.	3 mates, sq're rig, coast- ing.				
do	11 masters, F. and A., coasting.	3 mates, F. and A., coasting.				
Kentville	2 masters, F. and A., coasting.					
Kingston				5 mates, F. and A., inland.	1 master, steamer, inland.	

and Minor Inland, issued from 1883 to 1893, both years included—Continued.

1888—Concluded.

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
		5 masters, stra., minor inland.					
			4 mates, str., minor in- land.				
4 masters, steam tug, inland.		8 masters, stra., minor inland.	2 mates, str., minor in- land.			6 masters, steam tug, minor in- land.	
			3 mates, str., minor in- land.			2 masters, steam tug, minor in- land.	
		2 masters, stra., minor inland.					
		1 master, str., minor in- land.					

1889.

		2 masters, stra., minor inland.				2 masters, steam tug, minor in- land.	

STATEMENT of Masters and Mates' Certificates of Service, Coasting, Inland
SERVICE,

Place at which examination was passed.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Ottawa				1 mate F. and A., inland.		
Pictou, Ont.				do do		
Parrsboro'	4 masters, F. and A., coasting.					
Quebec						
St. John	5 masters, 1 mate, F. F. and A., and A., coasting. coasting.					
St. Catharines			2 masters, F. and A., inland.	5 mates, F. and A., inland.	2 masters, steamers, inland.	1 mate, str., inland.
Toronto			1 master, F. and A., inland.	do do	1 master, steamer, inland.	
Victoria					do do	
Yarmouth	2 masters, F. and A., coasting.	1 mate, F. and A., coasting.				
Kentville	1 master, F. and A., coasting.					
Kingston		1 mate, F. and A., coasting.	5 masters, F. and A., inland.	5 mates, F. and A., inland.		
Lunenburg	1 master, F. and A., coasting.					
Ottawa					3 masters steamer, inland.	
Pictou, Ont.			1 master, F. and A., in- land.			
Parrsboro'	7 masters, 1 mate, F. F. and A., and A., coasting. coasting.					
Pictou, N. S.	1 master, F. and A., coasting.					
Pugwash	1 master, F. and A., coasting.					
Quebec	1 master, F. and A., coasting.					
St. Catharines			3 masters, F. and A., inland.	2 mates, F. and A., in- land.	8 masters, steamers, inland.	1 mate, str., inland.
Halifax	12 masters, F. and A., coasting.	2 mates, sq're rig, coast- ing.			3 masters, steamer, inland.	do

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*1890—*Continued.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
		3 masters, strs., minor inland.				1 master, steam tug, minor in- land.	
		5 masters, strs., minor inland.		1 master, F. and A., minor in- land.			
5 masters, steam tug, inland.		do do				7 masters, steam tug, minor in- land.	3 mates, st'm tug, minor inland.
		1 master, str., minor in- land.				1 master, steam tug, minor in- land.	
		do do	1 mate, str., minor in- land.				
		1 master, str., minor in- land.	1 mate, str., minor in- land.			2 masters, tug, minor inland.	
		2 masters, strs., minor inland.				3 masters, st. tugs, minor inland.	

STATEMENT of Masters and Mates' Certificates of Service, Coasting, Inland
SERVICE,

Place at which examination was passed.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
St. John.....	4 masters, F. and A., coasting.	1 mate, F. and A., coasting.				
Victoria.....	2 masters, square rig, coasting.					
Weymouth.....	2 masters, F. and A., coasting.					
SERVICE						
Halifax.....	2 masters, square rig, coasting.	1 mate, sq'are rig, coast- ing.				
do.....	6 masters, F. and A., coasting.	2 mates, F. and A., coasting.				
Kingston.....			2 masters, F. and A., inland.	1 mate, F. and A., in- land.	2 masters, steamer, inland.	
Ottawa.....	1 master, F. and A., coasting.		2 masters, F. and A., inland.		3 masters, steamer, inland.	
Parrsboro'.....	5 masters, F. and A., coasting.					
Pictou, Ont.....					1 master, frt. steamer, inland.	
Pictou, N. S.....	2 masters, F. and A., coasting.				1 master, steamer, inland.	
Quebec.....					2 masters, steamer, inland.	
Shelburne, N. S.....			1 master, F. and A., inland.			
St. Catharines.....			2 masters, F. and A., inland.	3 mates, F. and A., in- land.	7 masters, steamers, inland.	
St. John, N.B.....	8 masters, F. and A., coasting.					
Toronto.....						1 mate, str., inland.
Victoria, B.C.....	2 masters, steamers, coasting.				1 master, steamer, inland.	
do.....	1 master, F. and A., coasting.					
Winnipeg.....					1 master, steamer, inland.	

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*1890—*Concluded.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR ISLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
		1 master, str., minor inland. do					

1891.

		1 master, str., minor inland.			1 mate, F. and A., m. inland.	
3 masters, st. tug, inland.		3 masters, strs., minor inland.				
1 master, st. tug, inland.						
do		2 masters, strs., minor inland.			2 masters, st. tugs, minor inland.	

**STATEMENT of Masters and Mates' Certificates of Service, Coasting, Inland
SERVICE.**

Place at which examination took place.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Barrington.....	1 master, F. and A., coasting.					
Brockville.....				1 mate, F. and A., inland.		
Halifax.....	9 masters, F. and A., coasting.	3 mates, F. and A., coasting.	1 master, F. and A., inland.		1 master, steamer, inland.	
do.....	1 master, square rig, coasting.					
Kingston.....			4 masters, F. and A., inland.	6 mates, F. and A., inland.		
Kentville.....	1 master, F. and A., coasting.					
Lokeport.....	1 master, square rig, coasting.					
Montreal.....						
Ottawa.....			1 master, F. and A., inland.	1 mate, F. and A., inland.	1 master, pass. str., inland.	
Parrsboro'.....	5 masters, F. and A., coasting.	2 mates, F. and A., coasting.				
do.....	1 master, square rig, coasting.	2 mates, square rig, coasting.				
Pictou, Ont.....				3 mates, F. and A., inland.		
Pictou, N.S.....	1 master, square rig, coasting.					
Quebec.....	1 master, steam tug, coasting.					
Rat Portage.....						
St. John, N.B.....	1 master, square rig, coasting.			1 mate, F. and A., inland.		
do.....	1 master, F. and A., coasting.	1 mate, F. and A., coasting.				
St. Catharines.....			1 master, F. and A., inland.	2 mates, F. and A., inland.	1 master, steamer, inland.	1 mate, frt. steamer, inland.
Sydney, C.B.....		2 mates, F. and A., coasting.				
Toronto.....				1 mate, F. and A., inland.		do do
Vancouver.....	1 master, F. and A., coasting.					

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*

1892.

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
1 master, steam tug, inland.							
		1 master, pass. str., minor inland.					
						2 masters, steam tug, minor in- land.	
		6 masters, pass. str., minor in- land.					
				1 master, F. and A., minor in- land.			
						1 master, steam tug, minor in- land.	
4 masters, steam tug, inland.	1 mate, stm. tug, in- land.	1 master, str., minor in- land.				3 masters, steam tug, minor in- land.	
1 master, steam tug, inland.		1 master, pass. str., minor inland.				1 master, steam tug, minor in- land.	

STATEMENT of Masters and Mates' Certificates of Service, Coasting, Inland
SERVICE,

Place at which examination was passed.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Victoria, B.C.	2 masters, F. and A., coasting.					1 mate, frt. steamer, inland.
do	1 master, pass. str., coasting.	1 mate, pass. steamer, coasting.				
Winnipeg.						
Yarmouth.	1 master, F. and A., coasting.					

SERVICE

Barrington, N.S.	1 master, F. and A., coasting.					
Brockville.						
Charlottetown.	3 masters, F. and A., coasting.				1 master, pass. str., inland.	
Chatham, N.B.	do do					
Halifax	13 masters, F. and A., coasting.	2 mates, F. and A., coasting.			3 masters, freightstr., inland.	
do	1 master, steam tug, coasting.				1 master, pass. str., inland.	
Kingston			1 master, F. and A., inland.	4 mates, F. and A., inland.		
Little Current.					1 master, pass. str., inland.	
Main à Dieu.	1 master, F. and A., coasting.					
Ottawa			1 master, square rig, inland.			
do			3 masters, F. and A., inland.	1 mate, F. and A., inland.		
Parrissboro', N.S.	2 masters, F. and A., coasting.	5 mates, F. and A., coasting.				
do		1 mate, square rig, coast- ing.				
Pictou, Ont.			1 master, F. and A., inland.	1 mate, F. and A., inland.		
Pictou, N.S.	3 masters, F. and A., coasting.					

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*

1892—*Concluded.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
		4 masters, pass. str., minor inland.					

1893.

		1 master, pass. str., minor inland.					
		5 masters, str., minor inland.				3 masters, steam tug, minor inland.	
1 master, steam tug, inland.		1 master, pass. str., minor inland.					
		1 master, frt. str., minor inland.					
		4 masters, pass. str., minor inland.				1 master, steam tug, minor inland.	
		2 masters, pass. str., minor inland.					

STATEMENT of Masters and Mates' Certificates of Service, Coasting, Inland
SERVICE,

Place at which examination took place.	COASTING.		INLAND.		INLAND.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
Pictou, N.S.	1 master, square rig, coasting.	1 mate, square rig, coast- ing.				
do	1 master, steam tug, coasting.					
Quebec.....	do do					
Sorel, Que.						
Summerside, P.E.I.	1 master, F. and A., coasting.					
Sydney, N.S.	1 master, steam tug, coasting.					
St. Catharines.			1 master, square rig, inland.		1 master, freight str., inland.	1 mate, pass. steamer, inland.
St. John, N.B.	7 masters, F. and A., coasting.	2 mates, F. and A., coasting.				
do	1 master, square rig, coasting.					
do	4 masters, steam tug, coasting.					
Toronto.....						
Victoria.....	1 master, freight str., coasting.					

and Minor Inland, issued from 1883 to 1893, both years included—*Continued.*

1893—*Continued.*

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
						3 masters, steam tug, minor inl'd.	
		1 master, pass. str., minor inland.					
1 master, steam tug, inland.		do do				1 master, steam tug, minor inl'd.	
		1 master, str., minor in- land.					
						4 masters, steam tug, minor inl'd.	
		1 master, pass. str., minor inland.					

**STATEMENT of Masters and Mates' Certificates of Competency and Service, Coasting,
RECAPITULATION**

YEAR.	FORE AND AFT AND SQUARE RIGGED SAILING VESSELS.		FORE AND AFT SAILING VESSELS.		STAMERS.	
	Coasting.		Inland.		Inland.	
	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
1883-84	35	1	10	1	25	5
1885	7	2	10	1	21	8
1886	23	5	7	1	8	6
1887	22		9	4	14	8
1888	21	1	14	3	17	7
1889	28	3	8	14	20	13
1890	41	5	13	8	34	15
1891	34	17	13	10	61	31
1892	42	21	6	5	18	13
1893	51	27	12	8	15	18
Total	304	82	102	55	233	124

RECAPITULATION

1883	33	2				
1884	575	76	328	146	145	73
1885	60	6	6	15	14	5
1886	36	8	18	7	4	3
1887	27	3	23	19	10	3
1888	32	6	19	6	13	3
1889	27	8	3	17	5	1
1890	32	5	9	7	14	2
1891	27	3	7	4	18	1
1892	28	11	7	15	3	3
1893	45	11	7	6	7	1
Total	922	139	427	212	233	95

TOT

Service	922	139	427	242	233	95
Competency	304	82	102	55	233	124
Grand total	1,226	221	529	297	466	219

Inland and Minor Inland, issued from 1883 to 1893, both years included—*Concluded.*
—COMPETENCY.

STEAM TUGS.		STEAMERS.		FORE AND AFT SAILING VESSELS.		STEAM TUGS.	
Inland.		Minor Inland.		Minor Inland.		Minor Inland.	
Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	Masters.	Mates.
1		5	3				
2		6	3			1	
2		3	2			6	
2		9	11			2	
2		12	10			5	
5		16	6				
3		8	2			4	2
5	1	10	16	1		8	
9		26	19	5		25	1
29	1	45					
		140	72	6		51	3

—SERVICE.

25		417	99	73		2	
2		34	4	4		2	
1		22	8			1	
8	1	26	1			5	
4		17	10			8	
5		17	1	1		11	3
		5	1			5	
5		6		1		2	
6	1	13		1		7	
2		18				12	
58	2	575	124	80		55	3

ALS.

58	2	575	124	80		55	3
29	1	140	72	6		51	3
87	3	715	296	86		106	6

SERVICE

STATEMENT showing the number and Grade of Service Certificates which have been
1872 to 1889, after

Name of Port.	1872.		1873.		1874.		1875.		1876.	
	Master.	Mate.	Master.	Mate.	Master.	Mate.	Master.	Mate.	Master.	Mate.
Annapolis.....										
Charlottetown.....					1				3	1
Cheverie.....					1					
Halifax.....	204	52	161	56	122	47	62	31	31	14
Liverpool.....		1								
Lunenburg.....										
Montreal.....						1				
New Carlisle.....										
Ottawa.....					1	1				
Parryboro'.....	1									
Port Medway.....										
Quebec.....	21	3	4				1	2	4	
Sydney.....										
Shelburne.....										
St. John.....	49	16	67	29	27	13	21	8	11	4
Thorne's Cove.....										
Victoria.....										
Vancouver.....										
Yarmouth.....										

Name of Port.	1883.		1884.		1885.		1886.		1887.	
	Master.	Mate.	Master.	Mate.	Master.	Mate.	Master.	Mate.	Master.	Mate.
Annapolis.....						1				
Charlottetown.....			1							
Cheverie.....										
Halifax.....	7	1	56	35	16	15	2		1	1
Liverpool.....				1		4			1	2
Lunenburg.....			6	10		4	1	3		
Montreal.....										
New Carlisle.....			1							
Ottawa.....										
Parryboro'.....										
Port Medway.....						1				
Quebec.....										
Sydney.....						3				
Shelburne.....			1		3	3				
St. John.....	2		6	1		1		1	1	
Thorne's Cove.....										1
Victoria.....										
Vancouver.....										
Yarmouth.....			4	6	4	3	3	1	1	

TOTAL Number of Service Certificates, Foreign Seagoing, issued from 1872 to 1893, both years included.

	Masters.	Mates.
Annapolis		2
Charlottetown	7	4
Cheverie	1	
Halifax	733	237
Liverpool	1	8
Lunenburg	7	19
Montreal		1
New Carlisle	1	
Ottawa	4	2
Parrsborough	1	
Port Medway		1
Quebec	35	8
Sydney	1	
Shelburne	5	3
St. John	202	84
Thorne's Cove		1
Victoria, B. C.	1	
Vancouver	1	
Yarmouth	13	11
	1,013	431

SICK AND DISTRESSED MARINERS.

Under the provisions of Chap. 76, Revised Statutes, a duty of two cents per ton register is levied on every vessel arriving in any port in the province of Quebec, Nova Scotia, New Brunswick, Prince Edward Island and British Columbia, the money thus collected forming "The Sick Mariners' Fund." Vessels of the burden of 100 tons and less, pay the duty once in each calendar year, and vessels of more than 100 tons three times in each year.

By an amendment to this Act passed at the session of Parliament in 1886, 50-51 Vic., chap. 40, it is provided that no vessel which is not registered in Canada and which is employed exclusively in fishing or on a fishing voyage, shall be subject to the payment of this duty.

The receipts for the fiscal year ended 30th June last amounted to \$46,190.64, being an increase of \$808.77 as compared with the preceding year. The increase, or decrease in receipts of sick mariners' dues in the various provinces was as follows:—Quebec, decrease \$531.76; Nova Scotia, increase \$157.62; New Brunswick, increase \$494.79; Prince Edward Island, increase \$8.76; British Columbia, increase \$679.36.

The Sick Mariners Act does not apply to the province of Ontario and consequently no dues are collected from vessels in that province, although a small expenditure is incurred on account of sick seamen. For a number of years past a vote of \$500 has been made by Parliament to the General Hospital at Kingston and a similar amount to the General Hospital at St. Catharines for the care of such seamen as may receive medical attendance in them. During the fiscal year ended 30th June sick seamen were paid for at a per diem rate of 90 cents. The amount paid to St. Catharines Hospital was \$313.20 for attendance on 7 sick seamen, 348 days. The sum of \$391.50 was paid the Kingston Hospital for attendance on 8 sick seamen, 435 days.

In the province of Quebec the expenditure on account of sick seamen amounted to \$6,629.43, being \$628.56 less than the previous year. The total collections for the entire province amounted to \$14,128.43, being \$531.70 less than the previous year.

At the port of Montreal sick seamen are cared for at the General Hospital and at Notre-Dame Hospital under an arrangement made by the department by which 90 cents per diem is paid for board and medical attendance of each seamen. The number of seamen admitted to the Montreal General Hospital was 67, and the number of days during which they received treatment and board was 1,004; whilst 134 outside patients were treated. The total cost being \$1,055.60. The amount paid the Notre-Dame Hospital was \$1,317.60 for the treatment of 145 sick seamen for a total number of 1,464 days.

Chicoutimi Hospital received 7 seamen to whom medical treatment and board were given, at a cost of \$426.10. The sick mariners' dues collected at the port of Montreal during the fiscal year ended 30th June, amounted to \$4,582.94.

At the port of Quebec sick seamen were cared for at the Jeffrey Hale and the Hôtel-Dieu Hospitals, the sum of 90 cents for each seaman is allowed in return for medical attendance and board. The sum paid the Jeffrey Hale Hospital was \$2,099.70, where 197 men received treatment for a total number of 2,186 days. The sum of \$421.10 was paid the Hôtel-Dieu Hospital for attendance to 21 seamen 459 days. The sick mariners' dues collected at Quebec amounted to \$7,347.42.

The expenditure on account of sick seamen in the province of New Brunswick for the fiscal year amounted to \$8,636.40, being \$2,614.63 more than the preceding year, and the collection of dues to \$8,993.62, or \$494.79 less than the previous year. Marine hospitals have been maintained at Miramichi, Richibucto and Bathurst.

The Marine Hospital at St. John has been closed as a more economical and satisfactory arrangement for the treatment of sick seamen has been made with the St. John General Public Hospital. In the Marine Hospital the average cost per man for the year 1890-91 was about \$1.08 per day, to the Marine and Fisheries Department. In addition to the expenditure on account of medical attendance and board a sum was annually expended by the Public Works Department for repairs, heating, lighting and water; averaging about \$1,100. The average yearly expenditure by both departments amounted to about \$4,700. It was found by a carefully prepared estimate that a sum not less than \$4,000 was necessary to put the building and surroundings in repair.

The department, in view of this, entered into an arrangement with the authorities of the St. John General Public Hospital to have the sick seamen in the Marine Hospital transferred to the Public Hospital on the 1st of February, 1893. The Commissioners of the General Public Hospital agreed to take care of sick seamen entitled to medical attendance and board for the sum of 90 cents per day, the same as is paid for seamen in public hospitals in Montreal, Halifax, Quebec and Charlottetown.

Gratuities were paid the medical attendant and chaplain and a year's salary to the keeper of the hospital. The latter has been allowed to remain in the building without any further allowance than fuel sufficient to heat a certain portion of the building.

Negotiations are now going on in connection with leasing the property.

At St. John, 41 seamen received treatment, 818 days, at a cost of \$826.20.

At Miramichi, 42 seamen were admitted and received treatment, 933 days, at a cost of \$1,115.47.

At Richibucto, 5 seamen were admitted and received treatment for 104 days. The cost of maintaining the hospital was \$442.30.

At Bathurst, 11 seamen were in hospital 502 days. The cost of maintaining the hospital during the year was \$613.88.

The St. Andrew's Hospital is in charge of the matron, who is allowed to charge \$3.00 per week for boarding sick seamen. No salaries are paid in connection with the maintenance of the hospital.

The Sackville Hospital has been leased to Mr. Bradford Carter for three years from 1892, at a nominal rental. The terms of the lease require Mr. Carter to keep the buildings in repair, and if the department should require the hospital at any time, it is to be handed over on notice being given.

In the province of Nova Scotia, marine hospitals are maintained at the ports of Yarmouth, Pictou, Sydney, Lunenburg and Point Tupper. The total expenditure on account of sick seamen in the province of Nova Scotia for the fiscal year amounted to \$12,102.28, and the receipts to \$15,454.60.

The Marine Hospital at Yarmouth, is located at Bunker's Island; 75 seamen were admitted during the year ended 30th of June, who were treated 1,400 days. The expenditure for this purpose being \$1,047.19.

At Halifax provision is made for the care of sick seamen at the Victoria General Hospital under arrangements made with the managers, by which the sum of 90 cents per diem is allowed for board and medical attendance to sick seamen. The sum paid the managers of the hospital for board and medical treatment during the past fiscal year was \$3,403.50; 222 men were admitted, and the number of days for which treatment is charged is 3,748.

At Lunenburg, 16 seamen were admitted and received medical treatment 325 days; the cost of maintaining the hospital being \$589.30.

At Pictou, 23 seamen were admitted to the hospital, their total treatment being for 507 days; the sum paid in connection with maintaining the hospital was \$963.70.

At Sydney, 45 seamen received medical treatment, the total number of days being 473, and the amount expended in maintaining the hospital was \$870.46.

At Point Tupper, 17 seamen were admitted to the hospital, the total number of days for which they received treatment being 146, and the amount expended in connection with keeping the hospital was \$373.93.

In the province of Prince Edward Island the amount expended on account of sick and disabled seamen during the fiscal year was \$2,018.41; and the receipts from sick mariners' dues were \$483.94.

Six seamen are cared for at the Charlottetown and Prince Edward Island Hospitals under arrangements made with the managers of these institutions at the same rate as is paid to the public hospitals in other parts of the Dominion.

The Prince Edward Island hospital admitted 7 sick seamen, giving them treatment for 176 days; the amount paid was \$158.40.

At the Charlottetown Hospital 32 men received medical treatment for a total number of 1,074 days. The sum of \$966.60 was paid to the managers for the fiscal year ended 30th June.

There is a marine hospital building at Souris, P.E.I., the property of the Government. The building is a substantial wooden building, but requires a good stone foundation. Temporary repairs were made to the foundation, costing the sum of \$250, in order to prepare it for renting. Tenders were invited in November, 1891, for the purchase of the property, as the Government had decided the Marine Hospital at Souris was not necessary. One tender only was received, but the offer was so low that the department did not deem it in the public interest to accept the tender.

In the province of British Columbia the sum of \$3,509.01 was expended for sick and disabled seamen, while the receipts from the collection of sick mariners' dues amounted to \$7,130.10.

The Marine Hospital at Victoria has in attendance a medical superintendent with a salary of \$300 per annum, a keeper whose salary is \$500 per annum; he is also allowed a rate of \$5 per week for board and attendance of each seamen. The keeper procures fuel, lights, bedding, etc., at his own expense. The number of seamen admitted to the hospital for the past year was 126, the total number of days during which they received treatment was 2,023, and the sum expended was \$2,289.26.

At ports where no hospitals are established, in the province of Quebec, Nova Scotia, New Brunswick, British Columbia and Prince Edward Island, sick seamen are cared for under the direction of the chief officer of customs when the vessels to which the seamen belong have paid dues, according to law. A circular to collectors of customs was issued 7th of February, 1891, permitting sick seamen to be attended at the port of arrival of a vessel, provided that the regular dues were previously paid at some port.

During the fiscal year the sum of \$2,137.52 was expended for shipwrecked and destitute seamen, under the provisions of the Sick and Distressed Mariners' Act. Of this sum \$725.79 were paid to Her Majesty's Imperial Government to reimburse expense incurred in caring for shipwrecked and distressed Canadian seamen in foreign ports.

The total expenditure by this department on account of sick and disabled seamen, and distressed and shipwrecked seamen amounted to \$35,052.37, and the appropriation by Parliament for this service was \$34,000. The dues collected amounted to \$46,190.69. It will be seen that the receipts exceeded the expenditure \$11,142.28.

The receipts and expenditure in connection with this service during the preceding 25 fiscal years were as follows :—

				Receipts.	Expenditure
				\$ cts.	\$ cts.
For the fiscal year ended 30th June, 1869.				31,353 78	26,987 64
do do	do	1870.		31,410 46	27,029 34
do do	do	1871.		29,683 41	28,971 22
do do	do	1872.		34,911 64	34,947 60
do do	do	1873.		37,136 10	41,016 43
do do	do	1874.		41,500 16	59,778 90
do do	do	1875.		37,801 46	50,684 76
do do	do	1876.		41,287 66	48,828 49
do do	do	1877.		43,739 21	51,647 94
do do	do	1878.		44,665 07	43,780 90
do do	do	1879.		37,779 57	42,729 36
do do	do	1880.		42,523 20	42,160 91
do do	do	1881.		49,779 72	40,667 52
do do	do	1882.		45,951 47	39,369 11
do do	do	1883.		45,573 42	36,249 66
do do	do	1884.		48,667 07	39,553 58
do do	do	1885.		39,068 39	44,501 57
do do	do	1886.		40,848 05	50,377 62
do do	do	1887.		42,334 92	37,447 35
do do	do	1888.		41,669 64	36,447 85
do do	do	1889.		39,306 29	41,320 59
do do	do	1890.		47,881 75	41,729 11
do do	do	1891.		43,829 68	35,155 12
do do	do	1892.		45,381 92	33,498 83
do do	do	1893.		46,190 69	35,052 37
Total				1,030,274 73	1,012,930 46
Deduct expenditure from receipts				1,012,930 46	
Excess of receipts over expenditure				17,344 27	

ICE BOAT MAIL SERVICE.

This service began on the 3rd of February, 1893, and continued up to the 10th April.

Three boats with their crews, numbering 15 in all, were found necessary to convey the mail matter across the Straits of Northumberland.

During the time in which the boats were engaged in the service 3,241 bags of mails, 1,157 pounds of baggage and 160 passengers were carried. The receipts, exclusive of the mail service, were \$414.71, and the cost of maintenance \$4,289.90.

Full details of the working of the ice boats were given in the twenty-fourth Annual Report.

A new boathouse has been built at Cape Tormentine for the accommodation of the ice-boats and a life-boat. Tenders were invited by public notice, and the tender of Messrs. Rhodes, Curry & Co., of Amherst, N.S., for \$1,890, being the lowest was accepted. It was found necessary to make excavations in connection with the roadway, and to give sufficient space between the bank and the building for drainage purposes. The total cost of the land, building, excavations and inspection was the sum of \$2,245.10.

MERCHANT SHIPPING

The total number of vessels remaining on the register books of the Dominion on the 31st December, 1893, including old and new vessels, sailing vessels, steamers and barges, was 7,113, measuring 912,539 tons register tonnage, being an increase of

106 vessels and a decrease of 51,590 tons register, as compared with 1892. The number of steamers on the registry books on the same date was 1,538, with a gross tonnage of 241,772 tons. Assuming the average value to be \$30 per ton, the value of the registered tonnage of Canada, on the 31st December last, would be \$27,376,170.

The number of new vessels built and registered in the Dominion of Canada during the last year was 362, measuring 28,440 tons register tonnage. Estimating the value of the new tonnage at \$45 per ton, it gives a total value \$1,279,800 for new vessels.

A statement follows, showing the number of vessels and number of tons on the register books at the different ports of registry in the Dominion, on the 31st December last, along with a comparative statement of the tonnage from 1873 to 1893. A statement is also published of the number of vessels built and registered in the Dominion during the last year, and a comparative statement of the number of new vessels built and registered from 1874 to 1893, both inclusive.

STATEMENT showing the number of Vessels and number of Tons on the Registry Books of the Dominion of Canada, on the 31st December, 1893.

PROVINCE OF NEW BRUNSWICK.

Name of Port.	Total Number of Sailing Ships and Steamers.	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
Chatham.....	294	30	1,416	9,757
Dorchester.....	9			4,921
Moncton.....	16	1	3	2,700
Richibucto.....	17	3	129	2,047
Sackville.....	12	2	41	1,266
St. Andrew's.....	140	5	109	3,486
St. John.....	522	62	7,107	131,909
Total.....	1,010	103	8,805	156,086

PROVINCE OF NOVA SCOTIA.

Amherst.....	8			906
Annapolis.....	60	3	85	7,268
Arsichat.....	121	1	66	5,035
Barrington.....	51	1	15	1,998
Canso.....	3			179
Digby.....	177	5	245	11,403
Guyaborough.....	38			1,889
Halifax.....	799	53	10,760	46,659
Liverpool.....	81	3	156	7,301
Lunenburg.....	334	5	347	29,284
Maitland.....	30			28,670
Pugwash.....	8			634
Parrsboro'.....	129	2	201	31,399
Pictou.....	65	15	1,073	15,247
Port Hawkesbury.....	67	2	43	2,536
Port Medway.....	23	1	45	1,879
Sydney.....	117	8	635	5,037
Shelburne.....	99	1	38	6,925
Truro.....	4			1,441
Windsor.....	181	11	2,408	118,005
Weymouth.....	39	1	154	3,814
Yarmouth.....	281	14	4,418	68,754
Total	2,715	126	20,689	396,263

STATEMENT showing the number of Vessels and number of Tons on the Registry Books of the Dominion of Canada, on the 31st December, 1893.

PROVINCE OF QUEBEC.

Name of Port.	Total Number of Sailing Ships and Steamers.	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
Amherst, M.I.	22			826
Gaspe	37	1	709	3,289
Montreal	479	155	54,695	82,352
New Carlisle	16	3	49	769
Perce				
Quebec	872	123	20,636	74,885
Total	1,436	282	76,089	161,121

PROVINCE OF ONTARIO.

Amherstburg	3			148
Bellefleur	14		495	811
Brockville	25	23	318	376
Bowmanville	4			752
Collingwood	53	51	5,798	4,328
Chippewa	3	3	263	153
Cramah	2			278
Chatham	28	17	1,121	1,677
Cobourg	6	2	51	474
Cornwall	3	2	181	214
Dunville	9	5	637	1,027
Deseronto	9	6	837	1,175
Goderich	43	24	696	2,019
Hamilton	47	34	8,341	7,180
Kingston	194	68	8,843	28,790
Napanee	6	2	295	721
Owen Sound	33	30	4,941	3,721
Ottawa	171	91	12,455	23,217
Oakville	6			513
Prescott	29	15	860	3,906
Port Burwell	15	7	175	1,158
Port Arthur	9	9	3,170	2,052
Port Dover	19	6	169	1,139
Port Colborne	7	2	95	616
Port Hope	64	38	3,297	6,152
Port Rowan	7	1	168	880
Port Stanley	11	9	1,257	1,103
Pictou	32	11	1,355	3,328
Sarnia	54	20	8,364	6,743
Sault Ste. Marie	14	11	477	528
St. Catharines	121	55	8,566	19,091
Saugeen	8	8	383	264
Toronto	230	157	16,688	17,173
Wallaceburg	35	20	1,342	2,337
Windsor	53	27	5,842	5,104
Whitby	3			515
Total	1,370	762	97,785	146,065

STATEMENT showing the number of Vessels and number of Tons on the Registry Books of the Dominion of Canada, on the 31st December, 1893.

PROVINCE OF PRINCE EDWARD ISLAND.

Name of Port.	Total Number of Sailing Ships and Steamers.	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
Charlottetown.....	188	24	6,056	20,970

PROVINCE OF MANITOBA.

Winnipeg	89	58	6,196	6,534
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PROVINCE OF BRITISH COLUMBIA.

Victoria.....	207	95	15,980	16,756
New Westminster	69	57	7,498	6,314
Vancouver.. ..	39	31	2,074	1,830
Total	315	183	25,552	24,900

SUMMARY.

New Brunswick.....	1,010	103	8,805	156,086
Nova Scotia.....	2,715	126	20,689	396,263
Quebec .. .	1,426	282	76,089	161,121
Ontario	1,370	762	97,785	146,665
Prince Edward Island	188	24	6,056	20,970
Manitoba	89	58	6,196	6,534
British Columbia	315	183	25,552	24,900
Total	7,113	1,538	241,172	912,539

COMPARATIVE STATEMENT showing the Number of Vessels and Number of Tons on
from 1873 to

Provinces.	1873.		1874.		1875.		1876.		1877.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
New Brunswick.....	1,147	277,850	1,144	294,741	1,133	307,926	1,154	324,513	1,133	329,457
Nova Scotia.....	2,803	449,701	2,787	479,669	2,786	505,144	2,867	529,252	2,961	541,579
Quebec.....	1,842	214,083	1,837	218,946	1,831	222,965	1,902	228,502	1,951	248,399
Ontario.....	681	89,111	815	113,008	825	114,990	889	123,947	926	131,761
P. E. Island.....	280	38,918	312	48,388	335	50,677	338	50,692	342	55,547
British Columbia.....	30	4,095	35	3,611	40	3,685	40	3,809	43	3,479
Manitoba.....					2	178	2	178	6	246
Total.....	6,783	1,073,718	6,930	1,158,363	6,952	1,205,565	7,192	1,260,893	7,362	1,310,468

	1884.		1885.		1886.		1887.	
New Brunswick.....	1,096	308,132	1,060	288,589	1,042	269,224	1,027	255,126
Nova Scotia.....	2,942	544,048	2,988	541,832	2,929	526,921	2,845	498,878
Quebec.....	1,628	202,842	1,631	203,635	1,650	232,556	1,586	189,064
Ontario.....	1,184	142,387	1,223	144,487	1,248	140,929	1,275	139,548
P. E. Island.....	234	39,213	227	36,040	225	30,658	225	29,031
British Columbia.....	116	11,403	123	11,834	134	11,900	149	12,789
Manitoba.....	55	5,722	63	5,439	65	5,578	71	5,811
Total.....	7,254	1,253,747	7,315	1,231,856	7,294	1,217,766	7,178	1,130,247

the Registry Books of the Dominion of Canada, on the 31st December, in each Year, 1893, both inclusive.

1878.		1879.		1880.		1881.		1882.		1883.	
Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
1,142	335,965	1,135	340,491	1,097	536,976	1,087	333,215	1,065	308,980	1,107	315,906
3,003	553,368	2,975	552,159	2,977	550,448	3,025	558,911	3,026	546,778	3,037	541,715
1,676	248,349	1,975	246,025	1,889	233,341	1,830	224,936	1,754	215,804	1,739	216,577
958	135,440	1,006	136,987	1,042	137,481	1,081	139,998	1,112	137,061	1,133	140,972
322	54,250	298	49,807	288	45,931	273	45,410	248	41,684	241	49,446
51	4,482	60	4,701	63	5,049	74	6,296	84	7,687	94	9,046
17	1,161	22	1,924	21	1,992	24	2,130	23	2,783	24	2,778
7,469	1,333,015	7,471	1,332,094	7,377	1,311,218	7,394	1,310,896	7,312	1,260,777	7,374	1,276,440

1888.		1889.		1890.		1891.		1892.		1893.	
1,009	239,332	1,013	218,873	981	209,460	969	193,193	946	181,779	1,010	156,086
2,851	485,709	2,855	464,431	2,793	464,194	2,778	461,758	2,731	425,690	2,715	396,263
1,498	178,520	1,455	168,500	1,399	164,003	1,404	162,330	1,408	162,638	1,423	161,121
1,330	139,502	1,352	141,839	1,312	138,738	1,345	138,914	1,347	141,750	1,370	146,665
218	26,586	224	25,506	231	26,080	195	23,316	196	22,706	188	20,970
167	14,249	176	15,241	196	16,024	246	19,767	298	23,448	315	24,900
69	5,745	77	6,091	79	6,475	78	6,197	81	6,118	89	6,534
7,142	1,089,642	7,153	1,040,481	6,991	1,024,974	7,015	1,005,475	7,007	964,129	7,113	912,539

LIST of Ports at which Vessels may be Registered, showing the Number of New Vessels Built and Registered, in 1893.

PROVINCE OF NEW BRUNSWICK.

Name of Port.	Total Number of Sailing Ships and Steamers.	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
Chatham	108			1,149
Dorchester	1			697
Moncton				
Richibucto				
Sackville	2			150
St. Andrew's				
St. John	13			823
Total	119			2,819

PROVINCE OF NOVA SCOTIA.

Amherst				
Annapolis				
Arlivat	8			96
Barrington	2			30
Canso	1			41
Digby	3			76
Guyaborough				
Halifax	11			484
Liverpool	9			858
Lunenburg	28			2,643
Maitland	2			2,487
Parsonsborough	15			3,750
Pictou	2			269
Port Hawkesbury	4			83
Port Medway	2			354
Pugwash				
Shellburne	9			341
Sydney	3			104
Truro				
Weymouth	1			31
Windsor	8			2,553
Yarmouth	8			869
Total	111			15,089

PROVINCE OF QUEBEC.

Amherst, M. I.				
Gaspé				
Montreal	29			2,762
New Carlisle				
Perce				
Quebec	31			1,468
Total	53			4,220

LIST of Ports at which Vessels may be Registered, showing the Number of New Vessels Built and Registered, in 1893—Continued.

PROVINCE OF ONTARIO.

Name of Port.	Total Number of Sailing Ships and Steamers.	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
Amherstburg				
Belleville				
Bowmanville				
Brockville				
Chatham	1			14
Chippewa				
Cobourg				
Collingwood	4			109
Cornwall				
Cramahe				
Deseronto				
Dunville				
Goderich	2			29
Hamilton	2			64
Kingston	5			1,020
Oakville				
Ottawa	13			611
Owen Sound	2			897
Picton	1			59
Port Arthur	1			29
Port Burwell	1			3
Port Colborne				
Port Dover				
Port Hope				
Port Rowan				
Port Stanley				
Prescott				
Sarnia	1			24
Saugeen				
Sault Ste. Marie	2			21
St. Catharines	2			18
Toronto	8			1,118
Wallaceburg	2			110
Whitby				
Windsor	2			
Total	49			4,126

PROVINCE OF PRINCE EDWARD ISLAND.

Charlottetown ..	3			634
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PROVINCE OF MANITOBA.

Winnipeg	8			608
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PROVINCE OF BRITISH COLUMBIA.

Victoria	10			358
New Westminster	3			189
Vancouver	6			397
Total	19			944

LIST of Ports at which Vessels may be Registered, showing the number of New Vessels Built and Registered in 1893—*Concluded.*

SUMMARY.

Name of Port.	Total Number of Sailing Ships and Steamers.	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
New Brunswick.....	119	.....	.....	2,819
Nova Scotia.....	111	.....	.....	15,089
Quebec.....	53	.....	.....	4,220
Ontario.....	49	.....	.....	4,126
Prince Edward Island.....	3	.....	.....	634
Manitoba.....	8	.....	.....	608
British Columbia.....	19	.....	.....	944
Total.....	362	.....	.....	28,440

COMPARATIVE STATEMENT of New Vessels Built and Registered in the Dominion of Canada during the Year ended 31st December, in each year from 1874 to 1893, both inclusive.

Provinces.	1874.		1875.		1876.		1877.		1878.		1879.		1880.		1881.		1882.		1883.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
New Brunswick	90	42,027	65	33,483	61	31,040	54	31,158	56	27,368	43	19,067	63	18,896	57	18,250	66	16,820	72	21,103
Nova Scotia	175	84,480	177	67,106	194	58,771	219	47,980	166	49,784	126	39,208	126	31,257	150	40,463	117	26,711	202	35,765
Quebec	73	20,796	103	22,825	51	17,800	62	19,253	46	10,870	25	7,421	33	8,673	56	5,111	26	6,785	42	6,594
Ontario	50	10,797	53	7,760	47	5,397	28	3,316	30	2,469	42	2,464	44	3,610	54	5,111	55	4,369	34	4,311
Prince Edward Island	88	24,634	83	19,838	62	14,571	62	17,026	3	10,382	20	5,279	21	3,359	15	4,351	15	3,508	17	5,343
British Columbia	5	276	1	121	2	204	2	48	2	13	5	788	1	100	2	85	8	1,631	5	849
Manitoba							3	48	1	13					2	116	1	289	2	125
Add new vessels built in Canada which proceeded to the United Kingdom under a Governor's pass without being registered	490	183,010	480	151,012	416	127,700	430	118,985	339	100,873	265	74,227	271	65,441	336	74,060	288	60,113	374	74,090
Add new vessels which left Quebec for registration in Germany	6	7,746			3	2,721	2	1,943	1	663							1	1,029		
Total	496	190,756	480	151,012	420	130,901	432	120,928	340	101,536	265	74,227	271	65,441	336	74,060	289	61,142	374	74,090
New Brunswick	46	12,888	34	7,736	34	4,931	18	2,949	32	2,530	50	4,792	35	5,572	43	6,269	21	1,873	119	2,819
Nova Scotia	178	42,032	102	24,703	93	20,948	87	12,310	116	12,965	126	15,645	160	33,907	130	35,528	105	16,446	111	15,089
Quebec	32	3,815	29	4,556	27	2,683	28	2,888	23	2,669	27	3,759	25	4,880	46	4,200	34	2,620	53	4,220
Ontario	58	4,446	45	4,509	52	2,075	66	2,993	62	5,065	45	3,259	41	4,917	44	2,662	34	3,684	49	4,126
Prince Edward Island	21	5,189	11	1,707	12	1,318	7	601	12	1,412	12	1,503	12	2,008	5	1,000	9	967	8	634
British Columbia	15	673	6	648	8	154	9	376	18	448	12	840	15	876	41	2,364	46	2,887	19	944
Manitoba	37	3,365	13	320	3	98	8	439	1	11	8	548	7	218	3	122	6	286	8	606
Add new vessels built in Canada which proceeded to the United Kingdom under a Governor's pass without being registered	387	72,411	240	43,179	229	32,207	224	22,516	264	25,130	280	34,346	285	52,378	312	52,145	255	28,773	362	28,440
Add new vessels which left Quebec for registration in Germany																				
Total	387	72,411	240	43,179	229	32,207	224	22,516	264	25,130	280	34,346	285	52,378	312	52,145	255	28,773	362	28,440

GEORGIAN BAY SURVEY.

The report of the Chief Engineer which forms an appendix to this report, contains information relating to the hydrographic surveys in progress under the direction of the department. The report of Mr. W. J. Stewart, who is in charge of the Georgian Bay survey, was made to the Chief Engineer and forms a part of his report. It will be seen that the officers and crew began their work in the "Bayfield" on the 4th of May and were engaged until the 12th of September. The sum of \$18,000 was voted for this service last session. The expenditure for the past fiscal year amounted to \$17,542.11, being \$1,091.01 more than the previous year.

The yearly expenditure on account of the Georgian Bay survey has been as follows:—

Year.	Amount.
1882-83	\$ 77 81
1883-84.....	26,745 54
1884-85.....	20,454 68
1885-86.....	17,759 36
1886-87.....	21,592 55
1887-88.....	19,468 13
1888-89.....	17,808 46
1889-90.....	17,969 23
1890-91.....	17,677 51
1891-92.....	16,451 10
1892-93.....	17,542 11
	<hr/>
	\$193,546 48

LONGITUDE OF MONTREAL.

By reference to the report of last year it will be seen that arrangements were made for determining the exact longitude of Montreal. The question is one of importance and is necessary for the construction of reliable hydrographic and other charts. The report of Professor C. H. McLeod, Superintendent of McGill College Observatory, published as Appendix No. 16, page 122, to the report of last year, contains information respecting the observations in connection with the work.

The following letter from Professor McLeod furnishes information as to the present stage of the work. The final reductions are being pushed with all possible haste both at Greenwich and in Canada.

" MCGILL COLLEGE OBSERVATORY,

" MONTREAL, 30th October, 1893.

"The Honourable

" Sir CHARLES HIBBERT TUPPER,

" Minister of Marine and Fisheries, Ottawa.

" SIR,—Replying to your request, I have the honour to report that all my observations in connection with the determination of the longitude of Montreal and Canso, made in the summer of 1892, have been reduced and the results forwarded to the Astronomer Royal for combination with the results of the English observers.

I have received from the Astronomer Royal the following as "provisional longitude results":—

"Montreal (The pier of the transit instrument in the observatory).....	4h. 54m. 18.7s.
"Canso (Hazel Hill. The pier near the office of the Commercial Cable Company).....	4h. 4m. 9.3s.
"Waterville (The pier near the office of the Commercial Cable Company).....	0h. 40m. 41.3s.

"My final report cannot be made until the Astronomer Royal has forwarded the completed reduction of the work.

"I am, sir, your most obedient servant,

"C. H. McLEOD."

STEAMBOAT INSPECTION AND CERTIFICATES TO ENGINEERS.

The annual report for the year 1893 of the Chairman of the board of inspection forms an appendix to this report. The statement showing certificates granted to engineers of steamboats, together with a list of steam vessels inspected and steam vessels not inspected; number of passengers allowed to be carried in each passenger steamboat; steam vessels added to the list, and steamers lost or laid up or rendered unfit for service during the year, will be printed in the supplement.

The amount received during the past fiscal year on account of tonnage dues, inspection of steamboats and certificates to engineers was \$25,295.35, of which the sum of \$24,521.35 was for tonnage dues and inspection fees, and \$774 for certificates to engineers. The expenditure for the fiscal year amounted to \$24,386.95, showing an excess of receipts of \$908.40.

The following is a comparative statement of receipts and expenditure:—

	Receipts.	Expenditures.
	\$ cts.	\$ cts.
For fiscal year ended 30th June, 1870	12,521 29	7,379 18
do do 1871	10,369 96	8,321 00
do do 1872	11,710 43	8,500 00
do do 1873	15,412 75	11,205 54
do do 1874	15,603 19	10,291 58
do do 1875	15,011 90	12,199 81
do do 1876	13,811 24	13,081 86
do do 1877	15,858 42	12,073 01
do do 1878	12,431 25	13,228 28
do do 1879	12,331 16	13,076 46
do do 1880	15,424 02	11,854 34
do do 1881	16,905 49	12,211 65
do do 1882	15,277 78	14,835 97
do do 1883	12,577 36	16,209 02
do do 1884	15,371 79	21,893 28
do do 1885	13,343 66	23,235 04
do do 1886	14,087 76	21,775 57
do do 1887	12,701 20	22,837 80
do do 1888	12,550 14	21,430 45
do do 1889	12,576 18	22,313 03
do do 1890	19,859 18	20,989 52
do do 1891	21,644 72	22,183 76
do do 1892	20,994 84	22,736 59
do do 1893	25,295 35	24,386 95
	363,672 06	389,269 69
Deduct receipts from expenditure		363,672 06
Balance to debit of fund		25,597 63

The Steamboat Inspection Act was further amended at the last session of Parliament. The details respecting the amendments will be found under "legislation," in this report.

The following list contains the names of the inspectors of boilers and machinery and hulls and equipment of steamboats, viz.:—

Name.	Position.	Address.
W. J. Meneilley	Chairman of Board of Steamboat Inspection.	Ottawa.
M. P. McElhinney	Inspector of hulls and equipments	do
C. R. Coker	do	St. John.
Thos. Harbottle	do	Toronto.
P. D. Brunnell	do	Quebec.
R. Collister	do	Victoria, B.C.
Thos. Donnelly	do	Kingston.
Jos. Samson	Inspector of boilers and machinery	Quebec.
George Taylor Clift	do	Montreal.
Douglas Stevens	do	Halifax.
Edward Adams	do	Kingston.
Jas. Johnson	do	Toronto.
John Dodds	do	do
J. A. Thomson	do	Victoria, B.C.
W. L. Waring	do	Halifax.
C. E. Robertson	do	Winnipeg.

COASTING TRADE OF CANADA.

By the provisions of chapter 83, Consolidated Statutes of Canada, being an Act respecting the Coasting Trade of Canada, no goods or passengers can be carried by water from one port in Canada to another except in British ships; but the Governor in Council may, from time to time, declare that the Act shall not apply to the coasting trade in such country. The Parliament of Canada was empowered to pass the Act alluded to under the provisions of the Imperial Act 32 Vic., chap. 11, intituled: "An Act for amending the Law relating to the Coasting Trade and Merchant Shipping in British Possessions," which came into operation in this country on its proclamation by the Governor General on the 23rd October, 1869.

It was ascertained that the following countries, viz., Italy, Germany, the Netherlands, Sweden and Norway, Austro-Hungary, Denmark, Belgium and the Argentine Republic, allowed British ships or vessels to participate in their coasting trade on the same footing as their own national vessels,—the ships of Italy by Order in Council of the 13th August, 1873; those of Germany by Order in Council of the 14th of May, 1874; those of Netherlands by Order in Council of the 9th of September, 1874; those of Sweden and Norway by Order in Council of the 5th November, 1874; those of Austro-Hungary by Order in Council of the 1st June, 1876; those of Denmark by Order in Council of the 25th of January, 1877; those of Belgium by Order in Council of the 30th September, 1879; and those of the Argentine Republic by Order in Council of the 18th May, 1881, were admitted to the coasting trade of Canada.

INSIDE SERVICE.

The following comprises the names of officials and employees engaged in the inside service of the Department of Marine and Fisheries on the 1st October, 1893.

Name.	Rank.	Salary.
Wm. Smith.....	Deputy Minister.....	\$ 3,600
John Hardie.....	Chief Clerk.....	2,400
S. P. Bauset.....	do.....	2,400
Wm. P. Anderson.....	Chief Engineer, General Supt. Lighthouses and Hydrographic Service.....	2,400
F. Gourdeau.....	Accountant.....	2,150
W. L. Magee.....	Chief Clerk.....	1,800
R. N. Venning.....	First class Clerk.....	1,550
W. H. Alexander.....	do do.....	1,500
W. P. McElhinney.....	do do.....	1,500
A. W. Owen.....	do do.....	1,450
E. Stanton.....	do do.....	1,450
J. S. Webster.....	Second class Clerk.....	1,400
J. B. Kent.....	do do.....	1,400
J. B. Halkett.....	do do.....	1,350
A. H. Belliveau.....	do do.....	1,300
V. C. Nicholson.....	do do.....	1,250
W. W. Stumbles.....	do do.....	1,250
V. H. Steele.....	do do.....	1,250
A. Halkett.....	do do.....	1,150
F. H. Cunningham.....	do do.....	1,150
T. Aumond.....	Third class Clerk.....	1,000
J. A. Murray.....	do do.....	950
J. McClenaghan.....	do do.....	950
D. C. Campbell.....	do do.....	900
R. Roy.....	do do.....	880
B. F. Burnett.....	do do.....	800
W. A. Mackinson.....	do do.....	700
A. H. Guion.....	do do.....	700
J. W. Watson.....	do do.....	550
W. C. Gordon.....	do do.....	500
E. W. Gilbert.....	do do.....	500
M. C. Doyle.....	do do.....	500
C. W. White.....	do do.....	400
John McCharles.....	do do.....	400
J. Morin.....	Messenger.....	500
J. A. Robertson.....	do.....	500

EXTRA CLERKS.

M. Lamouche.....	\$ 2 25 per diem
L. Bance.....	400 00 do ann.
M. O'Neil.....	400 00 do do
E. McQuarrie.....	25 00 do month.
L. Peck.....	15 00 do do

HYDROGRAPHIC SURVEYS.

W. J. Stewart.....	\$1,650 00 per ann.
C. F. Cox.....	1,300 00 do
B. H. Fraser.....	800 00 do
F. Anderson.....	700 02 do
L. J. Burpee.....	600 00 do
J. T. Fraser.....	600 00 do

OUTSIDE SERVICE, MARINE BRANCH.

The number of persons employed in the outside service on the 30th June, 1893, was as follows:—

Superintendent of lights and light-keepers, &c., in Ontario and above Montreal.....	160
Officers of agency in city of Quebec, light-keepers, fog-alarm keepers, crews of lightships, &c., at and near Montreal, in the province of Quebec.....	178
Agent, clerk, messenger, superintendent of lights, light-keepers, fog-alarm keepers, attendants at humane establishments, &c., in Nova Scotia.....	197
Agent, clerk, messenger, light-keepers, fog alarm keepers, &c., in New Brunswick.....	101
Agent and light-keepers in Prince Edward Island.....	41
Agent and light-keepers in British Columbia.....	16
Officers and crews of Dominion steamers and vessels, including Fisheries Protection Service.....	245
Captains of life-boats.....	19
Inspectors of steamboats.....	17
Examiners of masters and mate-, and clerk to chairman of board.....	15
Officers and servants in marine hospitals.....	23
Shipping masters.....	26
Harbour masters.....	187
Officers of observatories, meteorological observers, &c., receiving pay.....	149
Hydrographers and engineers, at Ottawa.....	7
Receivers of wreck.....	40
Wharfingers.....	115
Making a total of.....	1,536

For the previous year the number was 1,430. In addition to the 1,536 mentioned above, there are 79 registrars of shipping, who act under the direction and control of this department, but are, at the same time, collectors of customs at the various ports of registration, and receive no salary, or fees in their capacity of registrars. There are 95 measurers and surveyors of shipping at certain ports throughout the Dominion, who act as officers of this department, and are remunerated from their fees of office, although, in addition to such office, many of them hold a position in the customs service. Also, in addition to the above, by Orders in Council of the 21st April and 2nd December, 1874, the chief officer of customs at each port in the provinces of Quebec, Nova Scotia, New Brunswick, British Columbia and Prince Edward Island, where no separate shipping office has been established, is to be held and deemed a shipping master, is to receive the fees, make the half-yearly returns to this department, and act in that capacity under its directions.

From the above statement it will be seen that there are 149 officers of observatories, &c., who receive pay for the performance of their duties; but in addition thereto there is a large number of meteorological observers throughout the Dominion who give their services gratuitously.

METEOROLOGICAL SERVICE.

The report of the meteorological service by the Director, Mr. Carpmael, for the fiscal year ended 30th June, 1893, forms an appendix to this report. Mr. Carpmael reports that the interest taken by the general public in the information obtained from the data collected is shown by the increased number of inquiries from the legal, municipal and railway corporations, as well as private individuals. These inquiries entail a large amount of extra work, which is daily increasing.

The demand from persons in Toronto, and at a distance, for special forecasts continues to increase, and in all cases predictions have been furnished at once to those asking for them. As heretofore, predictions as to the approach of the first severe cold were telegraphed to the Harbour Commissioners, Montreal, enabling them to delay orders for taking up the buoys as late as possible.

Warnings of approaching storms were issued to railways.

The average number of inquiries regarding the weather by telephone at the Toronto office is about six per day. The number of inquiries by telegraph regarding the weather from outside places in direct telegraph communication with the Toronto office is about ten per week.

No charge is made in Canada for inquiries.

The information relating to forecasts is given to the public gratuitously and a display is made in conspicuous and public places in the various cities of the Dominion, of the forecasts.

The same practice exists in the United States. The forecasts are given as wide a dissemination there as possible for the benefit of all interests affected by weather or temperature changes.

When forecasts are requested for the benefit of the public, they are telegraphed at Government expense, but when utilized for the benefit of private interests the telegrams are sent at the expense of the recipients.

The Weather Bureau of the United States is connected with the Department of Agriculture at Washington.

The Meteorological Service of Great Britain is under the management of the Meteorological Council with the registered office in England. The council is an association receiving a parliamentary grant for meteorological purposes and has other sources of income.

Forecasts are supplied for subscribers at ten shillings per annum in addition to the cost of transmission, which may be by letter or book post. By daily telegraph the charge is threepence per day and cost of telegraphy.

Forecasts are supplied to clubs in London for a subscription of ten shillings per annum, and forecasts for public use at a fee of 2s. 6d. for a quarter, in addition to cost of telegrams.

Inquiries as to the weather, made personally or by messenger, are attended to on payment of one shilling. Inquiries by letter or telegram are answered on payment of one shilling.

MAGNETIC OBSERVATORIES.

The annual reports of the director of the Magnetic Observatory at Toronto and the observatories at Quebec, Montreal, Kingston and St. John, are attached to the

report on the Meteorological Service. The sum of \$4,672.59 was expended in connection with the Magnetic Observatory at Toronto, and \$500 each for the observatories at Kingston and Montreal. The total amount expended on account of Meteorological and Magnetic Observatory services for the past fiscal year was \$62,645.19.

REMOVAL OF OBSTRUCTIONS TO NAVIGATION.

The sum of \$5,000 was appropriated by Parliament for the removal of obstructions to navigation, and the sum of \$1,554.53 was expended during the fiscal year.

The barge "St. Pierre" was sunk by collision with the steamship "Ramleh" in the ship channel opposite the Commissioners' wharf, Three Rivers, P.Q. A light was maintained on the floating rigging of the barge until the rigging was removed. The water is 40 feet in depth above the barge, and it has not been considered necessary to remove the sunken vessel, as she does not form an obstruction to navigation.

The steamer "Lockwood" collided with the schooner "W. Nicholson" on the 13th November last, and sunk in the Limekiln Crossing Cut at the head of Bois Blanc Island. The wreck of the "Lockwood" was removed by the underwriters at no cost to the Government.

An old wreck which formed an obstruction to navigation in Bear River, Digby County, N.S., was removed in April last at a small cost to the department.

The schooner "Minnie Davis," owned by the firm of Danford & Alverson, of Port Huron, Michigan, was sunk by collision with another vessel near Bar Point Lightship, Lake Erie, on the 15th of November, 1892. The owners refused to remove the wreck or maintain lights upon it, and the department invited tenders for the removal. The tender of F. B. Hackett, of Amherstburg, for the sum of \$550, was accepted. The total expense connected with removing the wreck and maintaining lights was \$710.25.

The "Gladstone" was wrecked in 1888 and formed an obstruction to navigation near the breakwater in Southampton Harbour. Tenders were invited for the removal of the wreck in 1888, and the tender of Aaron McDonald for \$300 was accepted. Mr. McDonald assigned his contract to Mr. Richard Baker, who completed the work in September, 1892. The former owner removed to the United States.

The schooner "J. P. Aimes" was sunk near Harris' wharf, Moncton, N.B., in 1889. Tenders were invited for the removal of the wreck on the 30th June, 1892. The tender of Sévère Leger for \$60 was accepted, being the lowest, and the work was completed in September, 1892. Steps have been taken to recover the cost.

Obstructions to navigation in Moose River, Nova Scotia, were caused by brush and stone, the foundation of a mill owned by N. H. Upham. Mr. Upham declined to remove the obstructions. The department in the interests of navigation was therefore compelled to have the work done which cost \$60. Steps have been taken to recover this amount.

The schooner "Catherine" was sunk in the North-west Arm, Halifax Harbour, and abandoned by the owner who went to the United States. Tenders were invited and the contract for removal awarded to Messrs. Hefler Bros. of Halifax for \$150. The work was completed in June, 1893.

MESSENGER PIGEONS.

A report upon the messenger pigeon service established by the department forms an appendix to this report. It will be seen by the reports of Captain L. J. Dopping Hepenstal, Royal Engineers, late Superintendent of Signals, Halifax, and Captain D. Mills, Royal Engineers, present Superintendent of Signals, that changes have been made by removing some of the birds from the loft at the Marine and Fisheries wharf to the citadel signal station. The results of the training are also shown. The following is an extract from the Halifax *Morning Herald* concerning two birds liberated at Sable Island.

"GLOUCESTER, Mass., February 11.—Captain Crittenden of the schooner "Mabel Leighton" arrived from the western banks to-day and brings tidings of the loss of the schooner "Robert J. Edwards." He says 21st January, at 4 p. m. in lat. 42°30 long. 65°5 a carrier pigeon flew on board with a flat ring on the right leg marked H. 119; attached to the bird was a note plainly written on linen paper supposed to have come from the official in charge of Sable Island. The pigeon was greatly exhausted as if it had come a long distance; written on the paper were the words:

"Sable Island, 9.30 A.M., twenty-first, 1.94 E. 30 m. 113 and 119 together. American schooner "Robert J. Edwards" lost with all hands, on the south side in a south-west hurricane. January 12 R. J. Bontillier to H. W. Johnstone, all well.

The pigeon was kept on board 15 hours and everything done to resuscitate it. Finally seeing it was unable to make land the captain took the ring and note away when it flew and fell into the water, from which it could not be rescued.

SIGNAL SERVICE.

The report of Mr. McHugh, inspector of this service at Quebec, forms an appendix to this report.

CORRESPONDENCE.

The correspondence has been gradually increasing from year to year. In 1878 the number of letters received and registered was 5,853, while the number received and registered in 1891, at the end of the calendar year, was 9,326, in the Marine branch. For the year ending 30th June last, the number of letters received and registered was 14,200. This does not include the applications for masters' and mates' certificates, wreck returns, returns from the harbour masters, shipping masters, wharfingers, nor accounts, all of which are entered in books specially kept for the purpose. The number of letters sent from the department during the year ended 30th June was 12,000.

INSPECTION OF SHIPMENT OF LIVE STOCK EXPORTED FROM CANADA.

A report from the inspectors forms an appendix to this report. It will be seen that the total number of cattle shipped in 1893, was less than for the year 1892, the figures being 83,322 fat cattle for 1893 and 98,731 fat cattle and stockers for 1892. The scheduling of Canadian cattle in Great Britain was the cause of the decrease.

Whilst the number of fat cattle shipped was greater in 1893 than in 1892 no stockers were shipped during the past year for obvious reasons.

LEGISLATION.

The following Acts were past last session of Parliament, viz. :

An Act to amend the Merchant Shipping Act, with respect to load lines.

An Act respecting the Harbour Commissioners of Montreal.

An Act to amend the Inland Waters Seamen's Act.

An Act to amend the Wrecks and Salvage Act.

An Act further to amend the Steamboat Inspection Act.

An Act to amend the Act respecting the Harbour and River Police of the Province of Quebec.

These Acts were assented to 1st April, 1893, and form an appendix to this report.

I have the honour to be, sir,

Your most obedient servant,

WM. SMITH,

Deputy Minister of Marine and Fisheries.

Department of Marine and Fisheries, Ottawa.

APPENDIX No. 1

STATEMENT of Expenditure of Department of Marine for Fiscal Year ended 30th June, 1893.

Service.	Amount.	Total.
	\$ cts.	\$ cts.
Civil Government—		
Salaries.....	45,801 02	
Contingencies.....	10,676 19	
		66,477 21
Ocean and River—		
Maintenance, &c., Dominion steamers.....	146,521 77	
Repairs to steamer "Quadra".....	16,575 69	
Examinations of masters and mates.....	4,116 99	
Investigations into wrecks.....	643 49	
Removal of obstructions in navigable waters.....	1,564 53	
Registry of Canadian shipping.....	1,476 19	
Rewards for saving life, &c.....	7,432 64	
Tidal observations.....	5,069 17	
Winter mail service, Prince Edward Island.....	4,376 96	
Water police, Quebec.....	5,436 23	
		193,233 66
Lighthouse and Coast—		
Salaries and allowances of light-keepers.....	194,375 63	
Agencies, rents and contingencies.....	17,681 35	
Maintenance and repairs to lights, &c.....	258,702 99	
Construction of lighthouses.....	27,474 80	
Signal service.....	5,040 58	
Repairs to wharfs.....	84 90	
		503,360 25
Scientific Institutions—		
Toronto observatory.....	4,672 59	
Kingston do.....	500 00	
Montreal do.....	500 00	
Meteorological.....	56,972 60	
Determination of longitude, Montreal.....	1,520 41	
		64,165 60
Marine Hospitals, &c. —		
Sick and disabled seaman.....	32,900 33	
St. Catharines hospital.....	313 20	
Kingston hospital.....	391 50	
Shipwrecked and distressed seamen.....	2,152 04	
		35,757 07
Steamboat inspection.....		24,386 95
Survey, Georgian Bay.....		17,542 11
Survey, Bay of Quinté.....		2,085 45
Export cattle trade.....		1,711 73
Grand total.....		908,720 03

WM. SMITH,
Deputy Minister of Marine.

F. GOURDEAU,
Accountant.

APPENDIX No. 2.

STATEMENT of Revenue of Marine Department for the Fiscal Year ended 30th June, 1893.

Service.	Amount.
	8 cts.
Casual Revenue (sale of Shipping Forms, \$182.75 ; Sundries, \$3,854.11).....	4,036 86
Capes Mail Service.....	416 71
Dominion Steamers.....	14,589 76
Examinations Masters and Mates.....	2,484 00
Fines and Forfeitures.....	925 00
Harbours, Piers and Wharfs.....	7,871 92
Harbour Improvement.....	25 20
Harbour Police Dues.....	3,792 90
Lighthouse and Coast Service.....	990 00
Steamboat Engineers' Certificates.....	774 00
Steamboat Inspection.....	25,283 55
Sick Mariners' Fund.....	46,200 03
	107,389 93

WM. SMITH,
Deputy Minister of Marine.

F. GOURDEAU,
Accountant.

APPENDIX No. 3.

METEOROLOGICAL SERVICE.

The Honourable
The Minister of Marine and Fisheries,
Ottawa, Ont.

SIR,—I have the honour to submit herewith the twenty-third report of the Meteorological Service, this report being for the period July 1st, 1892, to June 30th, 1893, with appendices B and C, reports on Quebec and St. John observatories.

During the year the following stations were added to the number reporting:—

ONTARIO.

Class II.—

Chatham	R. C. Burt
Conestogo	Joseph Hurst
Biscotasing (resumed).....	Agent C.P.R.
Chapleau (do).....	Agent C.P.R.
Sudbury (do).....	Agent C.P.R.
Schreiber (do)..	Agent C.P.R.
Barrie.....	W. H. Buttery
Port Rowan.....	J. G. Boucher
Stratford.....	William Dick

Class III.—

Bloomington.....	B. B. Bemis
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MANITOBA.

Class II.—

Emerson.....	Michael Scott
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BRITISH COLUMBIA.

Class II.—

Glacier House.....	J. E. Bérube
Loch Erroch.....	Thomas Wilson
Chilcotin.....	W. J. Drumond
Fort Steele.....	Charles McLean
Quesnelle.....	J. E. Bourne
Vernon.....	M. Lumley
Hazel Mere.....	H. T. Thrift
Salmon Arm.....	A. G. Palmer
Mission Valley.....	A. Postill
Princeton.....	J. F. Allison
French Creek (Vancouver Island from Class III).....	W. H. Lee

Class III.—

Salt Spring Island, Gulf of Georgia	W. E. Scott
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During the year the following stations ceased to observe:—

Class II.—

Birnan, Ont.....	Mr. Mellor from ill-health
Sombra, Ont.....	Mr. Howell from want of time

The most serious loss the service has sustained has been the death of the observer at the chief station at Sydney, C.B., N.S., Mr. T. C. Hill, who for upwards of eighteen years was in charge of this station and performed his duties in a most careful and systematic manner, without an omission or a mistake during the whole period.

Instruments were supplied as noted in my last report to two clergymen proceeding to the McKenzie River district. One of those gentlemen, Mr. Stringer, stationed at Fort McPherson, Peel River, latitude 67 degrees N., longitude 135 degrees W., has already forwarded abstracts covering the winter of 1892-93, with curves for several months from a registering barometer with which he was furnished.

The observers in Ontario under the Deputy Minister of Agriculture, Mr. C. C. James, M.A., and in Manitoba under the Department of Agriculture, continue to discharge their self-imposed duties with commendable zeal and promptitude, and it will be seen from the large addition to the number of observers in British Columbia that considerable interest has been called forth by the special attention given to the work by the Minister of Agriculture and his deputy, Mr. J. R. Anderson, to whose selection of stations and reports upon persons recommended as observers I have in a great measure to rely, not only for those stations now reporting but for several others equipped or about to be so.

I have again to remark that in the case of those observers belonging to the staff of the Canadian Pacific Railway, liable as they are to constant removal from station to station, as the exigencies of their employment requires, this shifting tends very much to impair the value of their records and necessitates an amount of inspection for the purpose of personal instruction that is not required in other observers.

STORM SIGNAL SERVICE.

During the past year the storm warnings have been decidedly satisfactory and useful. Gales were numerous during the fall and spring, and in nearly all instances notice of their approach was given by means of the storm signals from five to twenty-four hours in advance. No important storm occurred which was not more or less satisfactorily warned. Bermuda has proved of great service, as many of the severe storms and hurricanes which pass up the Atlantic and affect our maritime coasts are first reported from this island.

TABLE No. 1.

The following table shows the total number of storm warnings issued and the percentage verified:—

Year.	Total number.	Number verified.	Percentage.
1877	743	510	68.6
1878	860	673	78.3
1879	712	501	88.0
1880	889	736	82.8
1881	854	727	85.1
1882	841	658	78.2
1883	1,085	858	79.1
1884	798	663	83.2
1885	830	741	89.3
1886	906	799	88.2
1887	1,093	972	88.9
1888	897	758	84.5
1889	1,126	926	81.3
1890	1,199	987	82.3
1891	1,017	826	81.2
1892	1,161	888	80.7
1893 Six months, 1st January to 30th June.	447	385	86.1

A storm signal station was established at Cheticamp, C.B., late in June, and Dr. N. Fiset was put in charge. This station should be of great service to the large number of fishermen living in or near this place.

WEATHER FORECASTS.

Weather forecasts have been published regularly throughout the period comprised in this report, both in the newspapers and in bulletin frames at about 1,500 telegraph offices in Manitoba, Ontario, Quebec and the Maritime Provinces.

The demand from persons in Toronto and at a distance for special forecasts continues to increase, and in all cases predictions have been furnished at once to those asking for them. As heretofore, predictions as to the approach of the first severe cold were telegraphed to the Harbour Commissioner at Montreal in November last, thereby enabling them to delay the taking up of the buoys to as late a date as possible.

Warnings of approaching snow storms, as heretofore, were issued to the railways.

Train weather signals as usual were displayed during the past summer on morning trains in the older provinces, and it is gratifying to be able to state that a great deal more care has been shown by the train hands in changing the signals.

The following table (No. 2) shows the predictions and the percentage of fulfilment in each district, in each month, and in the whole period :—

NUMBER of Predictions and percentage of fulfilment in each

MONTH.	MANITOBA.					LOWER LAKE REGION.					UPPER ST. LAWRENCE.				
	Number of predictions.	Verified.				Number of predictions.	Verified.				Number of predictions.	Verified.			
		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.
July	91	79	10	10	83.5	123	100	15	8	87.4	116	101	9	6	90.9
August.	95	62	16	17	73.7	107	86	14	7	86.9	94	72	10	12	81.9
September	105	73	18	14	78.1	116	89	13	14	82.3	113	83	17	13	80.0
October	98	73	10	15	79.6	117	93	16	8	86.3	113	85	14	14	83.4
November	92	59	19	14	74.5	108	91	9	8	88.4	107	82	15	10	83.6
December	93	70	12	11	81.7	108	79	21	8	82.9	102	83	12	7	87.3
January	94	60	20	14	74.5	113	86	20	7	85.0	90	80	7	3	92.8
February	79	57	9	13	77.8	96	72	16	8	83.8	92	68	13	11	81.0
March	95	69	9	17	77.4	100	70	26	13	76.1	99	65	17	17	74.2
April	92	65	16	11	79.3	120	82	23	15	77.9	103	80	16	7	85.4
May	93	79	10	4	90.3	116	92	16	8	86.2	102	84	11	7	87.7
June	80	61	15	13	77.0	109	87	16	6	87.2	101	77	18	6	85.1
Total	1,116	799	164	153	78.9	1,342	1,027	205	110	84.2	1,232	969	159	113	84.4

NOTE. The percentage of verification is obtained by taking the sum of those fully verified and half the

District in each Month, and in the Year July 1892, to June 1893.

LOWER ST. LAWRENCE.					GULF.					MARITIME.					TOTAL.				
Number of predictions.	Verified.				Number of predictions.	Verified.				Number of predictions.	Verified.				Number of predictions.	Verified.			
	Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.
121	94	21	6	86.4	117	94	12	11	85.5	120	104	10	6	90.8	688	564	77	47	87.6
95	60	14	21	70.5	97	63	16	18	73.2	89	63	16	10	79.8	577	406	86	85	77.8
109	74	17	18	75.7	111	83	17	11	82.4	109	87	15	7	86.7	663	489	97	77	81.0
102	75	14	13	80.4	99	69	11	19	75.3	105	84	13	8	86.2	634	479	78	77	81.7
106	73	18	14	78.1	104	70	18	16	76.0	102	80	13	9	84.8	618	455	92	71	81.1
99	77	11	11	83.3	98	77	12	9	84.7	100	77	17	6	85.5	600	463	85	52	84.3
94	82	6	6	90.4	100	83	14	3	90.0	97	73	19	5	85.1	588	464	86	38	86.2
93	72	10	11	82.8	90	72	8	10	84.4	97	65	19	13	76.8	547	406	75	66	81.1
95	68	14	13	78.9	93	68	15	10	81.2	97	67	15	15	76.8	588	407	96	85	77.4
105	81	18	6	85.7	100	79	11	10	84.5	101	74	18	9	82.2	621	461	102	58	82.4
101	86	9	6	89.6	97	72	13	12	80.9	96	73	16	7	84.4	605	486	75	44	86.5
97	61	11	17	76.8	94	65	12	17	75.5	93	68	15	10	81.2	583	427	87	69	80.7
1,216	911	163	142	81.6	1,200	895	159	146	81.2	1,206	915	186	105	83.6	7,312	5,507	1,036	769	82.4

sum of those partly verified and dividing by the whole number.

CENTRAL OFFICE.

The only change in the staff of the office since my last report was the resignation of Mr. F. G. Drewitt, assistant, on 31st July, and Mr. R. Cummings, telegraph operator, on 30th June.

The interest taken by the general public in the information obtained from the data collected is shown by the increased number of inquiries from legal, municipal, and railway corporations, as well as private individuals. These inquiries, however, entail a large amount of extra work, which is increasing daily.

TIME SERVICE.

The method of performing this work, together with a table showing discordance at the different observatories, will be found in the report on the Magnetic Observatory.

The report on Quebec observatory forms Appendix B.

The report on St. John observatory forms Appendix C.

VOLUNTARY OBSERVERS.

It is desirable to again draw attention to the indebtedness of this country to the many volunteer observers throughout its wide range, by whose assistance so much has been done towards interesting the public generally in a study of its varied climate, and it is much to be regretted that want of funds have necessitated a refusal from time to time to many requests for instruments, as the information given in our Monthly Weather Review is largely contributed by unpaid observers.

PUBLICATIONS.

Applications are frequently made by persons and institutions in different parts of the world for the publication of this office. Nearly 750 annual reports and over 800 copies of the Monthly Weather Review are distributed immediately upon their being printed.

LIBRARY.

The number of publications received during the year was 290, being for the most part annual reports, pamphlets, and periodicals from the principal astronomical, meteorological and magnetical institutions of the world.

INSPECTION OF STATIONS.

There were 78 stations inspected during the period covered by this report. Of these 20 were inspected by Mr. Payne, 19 by Mr. Stupart, and 39 by Mr. Webber.

These reports form Appendix A, and give the state and condition of the various places visited, and show the absolute necessity of regular and systematic inspection.

CLIMATOLOGY.

Early in the last fiscal year there was some correspondence between this office and the department regarding the accumulation of climatological data in this office, and it was suggested that a work on the climatology of the Dominion should be prepared from existing data. It is very desirable that this work should be proceeded with, and I would respectfully suggest that provision should be made for it in the supplementary estimates.

All of which is respectfully submitted.

CHARLES CARPMAEL,
Director.

APPENDIX A.

INSPECTORS' REPORTS.

INSPECTOR H. V. PAYNE.

Roberval, Que., visited 21st July, 1892.—This station is on the south shore of Lake St. John, near the town. The exposure for thermometers is good and thermometers are properly placed. Minimum thermometer was out of order, reading 2° too low; this was corrected; rain gauge not properly placed and changed to good position. The observations had not been continuous owing to absence of volunteer observer who expects to be more permanently resident in future.

Chicoutimi, Que., visited 23rd July, 1892.—The observations which are made by the cloister nuns are fairly well taken, and instruments well placed. They know how to read the instruments properly and are fair observers. I pointed out several errors in the records. Minimum thermometer reading 1° too low, for which a correction will be applied. Barometer in good order but no means at present of determining height above mean sea level. This can be obtained later from survey of new line of railway.

Dalhousie, N.B., visited 26th July, 1892.—Barometer in good order, but attached thermometer was broken, and agent was using thermometer C. 32, which was not in good order. Other instruments in good order. A new large thermometer shed is necessary. The new storm signal mast is placed behind the post office, which is not as good a position as the old one on the wharf. The mast is a good one and well set up, but requires painting.

Chatham, N.B., visited 27th July, 1892.—Barometers, thermometers and rain gauge all in good order, but the position of the thermometers, in a small yard surrounded by buildings, is very poor, and readings are liable to show higher than the true temperature. The anemometer as exposed is useless. A new wind vane is required. The new post office in course of erection would (if the roof was utilized) give a far better exposure. Records are well kept.

Point Escuminac, visited 28th July, 1892.—The new observer required to be fully instructed. The anemometer was not working and no proper elements for batteries to hand. I obtained some supplies from Chatham and adjusted anemograph, etc., placing them in working order. Windvane is wearing out and will soon require renewing. New wires will require to be strung from house to fog-whistle, the present ones being too much twisted and are interfering with each other. Instruments are in good positions.

Pictou, N.S., visited 2nd August, 1892.—Storm signals were all in good order. Mast and shed required painting. Barometer in good order. The maximum thermometer is an old instrument and is reading 1° too high. The minimum was reading 6° too low, some spirit being detached. This was shaken down and instrument then read all right.

Port Hood, C.B., visited 4th August, 1892.—New signal mast is a good spar and properly set up. Ordered alterations to signal shed to facilitate the hoisting of signals.

North Sydney, C.B., visited 11th August, 1892.—The signal mast is in good shape, but will require painting next spring. The new signal shed is properly erected. I was unable to see signals as agent was out of town.

Low Point, C.B., visited 12th August, 1892.—The anemometer and anemograph are in good order. The anemometer stand has been raised 7 feet, giving a better exposure. Wind-mill vane not working very satisfactorily. The inside contact is the general trouble with these instruments.

Sydney, C.B., visited 13th August, 1892.—Barometer in same position and comparing well with standard. Thermometers of ordinary class in good order and all reading well with standard. Turn-over thermometer working, but packing required on throw-back bar and glass catches on ends of thermometers requiring wire attachments. The glass catches are a poor arrangement and easily broken. New building being erected to S.S.E. rather interferes with wind records from that direction. Wind vane re-set to N. 28° W. compass. Sunshine recorder properly set.

Louisburg, visited 15th August, 1892.—Stays ordered for mast last year were not in place; ordered this to be done at once, also ordered mast to be painted, shed whitewashed and roof tarred. Last coat of painting was evidently priming (put on by former agent). Mast is getting old, but with stays may last some time yet, as foot seems sound.

Shippegan, N.B., visited 19th August, 1892.—This mast is not a good stick and is not straight. It has been poorly stayed. Stays being cut too short requiring several feet of lanyards which at the time were very loose. The position is not a good one; in fact it ought to be at "The Gully" through which all boats pass, and from which it would be in full view of the open fishing ground. Where it is, it is only seen from the inland waters. Ordered stays to be tightened and shed painted. At present it is rough boards unpainted.

Caraquette, visited 22nd August, 1892.—Mast very well set up 45 feet above ground; would have been better if it was 10 feet longer. Shed and signals in good order. Position is a good one.

Bathurst, visited 23rd August, 1892.—Agent was away, and I could find no one who had been left in charge. Signal mast is in good order and well painted. The anemometer, in its present position, is useless.

Richmond, Que., visited 25th August, 1892.—Station in good order and volunteer observer much interested in his work. Would take hygrometric observations if another thermometer be sent him. Also wants new wind vane, old one being burnt at a fire. Minimum thermometer reading 2° too low. This was put in order.

St. Hyacinthe, Que., visited 27th August, 1892.—All instruments in good order. Thermometer shed well placed, but required a few alterations. Rain gauge well placed; would take wind observations and barometric readings if instruments were supplied him. Exposure for anemometer would be a good one on top of dome of college. Records well kept.

Parry Sound, Ont., visited 10th November, 1893.—Placed new signal agent, Mr. J. M. Logan, in charge. Mast and signals in fair order. Mast requires painting, and minor repairs necessary to signals and shed. These will be attended to at once by Mr. Logan.

Woodstock, Ont., 29th May, 1893.—On arriving at this station I found anemograph arms had blown away. A new anemometer was placed in position. Battery zincs much corroded, owing to wires touching zinc air flume. Battery, which is in cellar, was ordered to be placed upstairs in loft.

Port Stanley, Ont., 30th May, 1893.—The anemometer tower is in a broken down state and not safe to remain as it is. The woodwork is very rotten at base, after being twenty years in use. I would recommend that it be pulled down and a new derrick be erected in its place. It would have to be 50 feet high and can be of open work. This is the only way (owing to the surrounding trees) of obtaining a proper wind exposure.

Stratford, Ont., visited 31st May, 1893.—I started a new volunteer temperature and rain-fall observing station here. The premises are well adapted for observing, and consider W. Disk will make a good observer.

INSPECTOR B. C. WEBBER.

Port Stanley, visited 2nd August, 1892.—It was found necessary to have the anemometer wires raised higher, as the growth of neighbouring trees interfered with the proper working of the instrument. The stand carrying the anemometer is very rotten; it will be patched up once more, but shortly it will have to be replaced. A new anemometer shed had to be substituted for the old one, which was quite worn out.

Peterborough, visited 4th August, 1892.—Returned minimum thermometer 72.106 to this station, it having been put in good order. Instructed observer how to unite the spirit in the thermometer, should it again become separated. The rain gauge was quite worn out, necessitating the substitution of a new one. The instruments are well exposed and Mr. Telford is a good, conscientious observer.

Sarnia, visited 5th September, 1892.—The new mast and drum house have been well and substantially built on the site on the waterworks wharf generously placed at our disposal by the Sarnia town council. A ladder has been erected alongside it, running down to water, for the convenience of vesselmen wishing to land and make further inquiries as to the expected weather (as it frequently occurs). The ladder was erected by the contractors gratis. I instructed Mr. McAdam in the duties required of a storm signal agent and feel assured that they will be faithfully attended to.

Parry Sound, visited 4th October, 1892.—A new binding screw for velocity marks in anemograph had to be furnished. The water tower erected forty feet to the southward of the anemometer tower only seriously affects one exposure from that direction. It is to be hoped that the Parry Sound council may eventually allow our service to place the anemometer on the water tower; in the meantime, however, some necessary repairs and paintings are very urgently needed on the erections now carrying the wind instruments. Mr. McKinley refused to act as storm signal agent any longer, until another agent is appointed Mr. Foote, the telegraph agent, kindly offered to do the work. The mast is a fine stick, but the drum house was out of repairs. It was reported to me that for some time the storm signal work had been very carelessly attended to at this station; the lamps certainly had the appearance of never having been used.

Beatrice, visited 6th October, 1892.—There was a large amount of air in the barometer, reading .035 inches. Mr. Hollingsworth has been in the habit of cleaning the barometer; hence the probable cause of the error. The thermometer shed is to receive a coat of paint.

Sprucedale, visited 7th October, 1892.—There was detached spirit in the minimum thermometer here of a sufficient amount to make it read 4° too low. The thermometers had been read early in the morning and entered on day read, so the maximum temperature is for the preceding day. In the future the thermometer will be read in the evening.

Cook's Mills, visited 8th October, 1892.—The observer was away on vacation and had left no one to do the observing. It appears Rev. Mr. Sims is not permanently located at Cook's Mills, so evidently the work, under existing conditions, will not be satisfactory. The instruments are in splendid order, but their position in a hollow close to the water is not a good one.

Sault Ste. Marie, visited 8th October, 1892.—The mast is a particularly good one, but it leans towards the west owing to insufficient staving. It will be necessary to sink several loads of stone in water to make a suitable foundation for the west stay. Major Elliott will procure tenders for this work, as well as for painting the mast and drum house. The lamps had to be changed, as they were faulty and would not burn. Major Elliott says that American vesselmen are of the united opinion that the drum and cone is preferable to their own system of flags.

White River, visited 10th October, 1892.—Moved the barometer from its awkward position in the telegraph office to a convenient place in observer's parlour; it received the requisite cleaning, as it was very dirty. I remained here three days in order to take a set of barometric readings to determine if the persistent high readings of the barometer at this station compared with adjoining stations was correct, and the result of my comparisons proves that such is the case. The minimum thermometer had detached spirit, making it read 1.5° too low. One catch at the end of tube was also broken. Another minimum was substituted.

Rockliffe, visited 14th October, 1892.—A large amount of the mercury had leaked out of the barometer at this station, and it was barely possible to set it as high as 29.70 inches. The leak had evidently occurred where the metal collar binds the bag to the cistern. Mr. McIntyre quite understands the manipulation of the barometer and says he is convinced that no one else had touched it. I thoroughly

renovated the barometer and left it reading correctly. I tested and remarked the thermometers; the minimum reads 1° too low. The observer had fallen back into the old error of entering 1 inch of snow as .01 instead .10.

Sudbury, visited 9th October, 1892.—I left ordinary thermometer, No. 2631, taken from Sprucedale, to replace the one stolen from the C.P.R. station here. Mr. Smale, the agent, promised to have a lock put on shed at once and to send in returns regularly.

Woodstock, visited 8th March, 1893.—Barometer cleaned; it was in a very dirty condition inside and out, owing to the use of matches instead of a lamp to take the night readings. The wind gauge battery was cleaned thoroughly; it was in a filthy condition. The maximum and minimum thermometers are correct; absence of knowledge of how to manipulate them has been the trouble. Found water in rain gauge, which observer could not explain, another instance of the general carelessness that has been displayed in the work. Unless more faithful work is done at this station in the future than in the past year or so, it is questionable whether it is worth while continuing the observations. The anemometer platform has been made higher, which improves the velocity exposure.

Port Rowan, visited 9th March, 1893.—I instructed Mr. Boucher of this place in the duties of an observer, he having generously offered to do the work. His grounds are spacious and well adapted for the exposure of instruments. Miss Templeton-Armstrong, who lives near by, will attend to the observations should Mr. Boucher be absent at any time.

London, visited 10th March, 1893.—All in good order at this station, except that some repairs were necessary to the rain gauge.

Petrolia, visited 11th March, 1893.—Closed this station and returned instruments to central office, Mr. Bell having refused to continue the work unless remunerated for it.

St. Hyacinthe, visited 2nd May, 1893.—Left barometer 1028 at this station in charge of the nominal observer, Father Choquette. The proposed position for the anemometer on the dome, 130 feet from ground, is a good exposure, but the difficulties in placing an instrument there are so great that I do not think the idea feasible, although Father Choquette is sanguine that he can overcome the obstacles. The anemometer had already been promised to this station before my visit.

Sydney, visited 6th May and 3rd June, 1893.—Removed the instruments from the late observer's to the house of the new observer, Mr. McIsaacs, those not required under the new regime being returned to the central office. The new position for the instruments is a better one than the old. I thoroughly instructed the observer in the work and left him competent. Mr. McIsaacs afterwards went away from Sydney and failed to leave his assistant well instructed. I was ordered to return to Sydney to teach the assistant, and these orders were faithfully carried out. Mr. Laffin has since done the work with great accuracy. The barometer is placed 12 feet lower than its old position and reduction table is corrected accordingly. The telegraph company will run a wire into observer's house at small cost, and as this will lessen the chances of delays I recommend that it be done.

North Sydney, visited 8th May, 1893.—The mast is rotting about twenty feet from its base and will likely soon come down. It is too old to repaint, although in need of it. The drumhouse is well and substantially built and the signals are in good order.

Low Point, visited 9th May, 1893.—Some of the wires attached to the wind gauge needed a little tightening; the exposure for velocity at this station is only fair.

Glace Bay, visited 11th May, 1893.—The signal lamps are not used at this station, as the agent reports that no vessel can either enter or leave the harbour except in daylight. The excuse for failing to send in storm reports was the want of requisite stationery.

Cow Bay, visited 11th May, 1893.—The new mast is a good stick, and both it and the drumbox have been erected according to specifications. The halyards were still unwove on my arrival. The agent promises that storm reports shall be carefully attended to.

Halifax, visited 15th May, 1893.—Cleaned the barometer at this station as it was becoming opaque; some slight repairs were necessary to the anemometer, as well as to the approaches to the other instruments. At the citadel the mast is in excellent order, but the cone is much worn, the anemometer originally placed at the citadel has become destroyed; undoubtedly an excellent exposure is obtainable at this point, and considering that the one at the observer's house is so poor, I would suggest that the Imperial authorities be asked to kindly allow another anemometer to be erected in the citadel and that a small remuneration be granted to the person in whose charge it may be placed. It appears necessary that a good exposure for wind be obtained, for in the first place the proposed station at Sambro Island has not been successful, and secondly our observer unquestionably much underestimates wind force, doubtless owing to the faulty exposure of her gauge.

Liverpool, visited 17th May, 1893.—Arrived here towards evening, and as I found the cone was flying, remained incog. to see if the lamps were substituted at night according to instructions to agents. I have to report that the lamps were not substituted, and when approached on the subject next morning Mr. Hemmen's plea was illness and failure to get one of the lamps to burn. The mast and drum-house were greatly in need of paint, after the absence of it for eight years. I have further to report that a moderate gale was certainly experienced at Liverpool on this occasion, but Mr. Hemmen considered that no storm was occurring.

Yarmouth, visited 19th May, 1893.—Cleaned the barometer, as it was opaque. The connections were erroneously made to the wind gauge, consequently the direction was not, and had not been recording for two years. The anemometer itself was also faulty and had to be replaced; the exposure for velocity is very fair.

Digby, visited 20th May, 1893.—Work still performed in the old careless style at this station; maximum thermometer was useless. Signal lamps evidently not used for a very long time, and when closely questioned on the subject Mr. Turnbull admitted that he seldom used them, his chief excuse being that he could not get them to burn. The cone and drum were quite worn out, probably owing to want of care. Mr. Turnbull promises to do better in the future.

St. John, visited 22nd May, 1893.—Cleaned the barometers at this station. The work is done well and conscientiously, but Mr. Hutchison is much handicapped with the new transit instrument temporarily loaned him to take the place of the one destroyed in the customs house fire, until such time as the new one promised is forthcoming.

Grand Manan, visited 23rd May, 1893.—The exposure for the anemometer here on the bluff adjoining the swallow-tail lighthouse is about the best we have in the country, but on my arrival the instrument was not working, owing to want of battery power and defective connections. Cleaned the barometer, which was opaque. The remaining instruments were in very good order.

St. Andrew's, visited 24th May, 1893.—The barometer had not been cleaned before for eight years and was extremely opaque. The minimum thermometer had detached spirits in tube equivalent to $1^{\circ}5$; cannot say how long this error has been, as observer was not aware of its existence until pointed out to him. The new mast is a capital stick. Dr. Gove still complains that signal lamps will not keep alight.

Point Lepreaux, visited 26th May, 1893.—A new rain gauge was needed here to replace the old one worn out. A supply of lamp chimneys was also required. Mr. Thomas complains of great trouble in keeping signal lamps alight. The new mast is a good stick.

Charlottetown, visited 30th May, 1893.—The anemometer had worn loose in its socket and had to be replaced by another one; all other instruments were in good order, and Mr. Newberry continued to attend to the duties with great care and zeal.

Tignish, visited 30th May, 1893.—The mast is erected at the harbour, and the telegraph office is in the village, four miles distant. Our agent lives on the road to harbour and a mile from it. The telegraph agent will not deliver messages unless well paid, but Mr. Richards, who lives adjoining telegraph office, has offered to deliver messages promptly and reasonably, and his tender was the lowest that could be pro-

cured. Tignish is an important point for the display of signals, as in the autumn as many as two hundred vessels fish off the harbour, and they are reported to appreciate the value of the warnings. Mr. Conroy, our agent, attends faithfully to the duty; he reports that until he covered the bottoms of the lamps tightly over with canvas they would not burn; now they give great satisfaction.

Pictou, visited 31st May, 1893.—The work at this station is attended to with the usual care and diligence.

Point Hood, visited 1st June, 1893.—One of the wire stays had torn away from mast, otherwise all is in good order. The lamps would not burn at this station until the air holes in the bottoms were plugged up.

Point du Chêne, visited 27th May, 1893.—Instructed one new agent in the duties required of him. The mast is a very poor affair; it will receive some necessary repairs. The harbour authorities will not allow the signal lamps to be used here, as it is claimed they interfere with the range lights.

Cheticamp, visited 2nd June, 1893.—Rev. Father Fiset has generously permitted the mast to be erected on his wharf, the most commanding position it could be placed in. The wharf adjoins our agent's residence, and as he has the telegraph office everything is very convenient. I fully instructed the agent in the duties required. Mr. Frazer, of Point Hood, received the contract for erection of the mast and the Rev. Father Fiset kindly offered to superintend its construction. Cheticamp is a large and growing fishing village, and warnings should be of much value here.

Chatham, visited 10th June, 1893.—Moved the barometer from its awkward position to one where it could be conveniently read, and gave it the requisite cleaning. The exposure for instruments here, as before reported, is very poor, and that of the anemometer useless. The observer, however, evidently attends to the duties with diligence.

Point Escuminac, visited 8th June, 1893.—Removed the anemograph from its awkward position to one where it could be conveniently attended to. The windmill vane was quite worn out and a new one had to take its place. The anemometer is still in good condition and shows no apparent wear. Mr. McLennan conscientiously attends to the duties at this station. For some time he has been handicapped owing to the defective vane.

Bathurst, visited 11th June, 1893.—Instruments badly exposed and work evidently attended to with utmost carelessness, consequently valueless. The rain gauge was inside of the thermometer shed, and the signal lamps seemingly could not at first be found. I was informed by a man who has lived adjoining one signal mast for some years that he has never seen the lamps displayed. Everything in connection with the storm warning apparatus was in poor condition, and the drum box is without a lock. The barometer was very opaque, and received the requisite cleaning. A change is urgently needed at this station.

Quebec, visited 12th June, 1893.—One of the springs in contact wakes in wind vane had become useless and failed to make contact, and this was the cause of erroneous directions often sent. The rain gauge was not solidly fastened to post, but this error has never been rectified.

INSPECTOR R. F. STUPART.

Kamloops, B.C., 1st July.—Mr. Jones, the observer at this station, is a thoroughly good observer and takes decided interest in the work. The instruments—a full set of thermometers and a rain gauge—are satisfactorily placed. Mr. Jones had been taking observations with regularity, but not forwarding them to Toronto, as he wished to keep the original records and had not had time to make duplicates. It was agreed that if he would send original to the central office it should be copied and then returned to him.

Griffin Lake, B.C., 2nd July.—A new Canadian Pacific Railway agent promises to continue the observations at this station. He thoroughly understands reading the thermometer and rainfall and the registration of the same. Both thermometer screen and rain gauge are well placed.

Glacier House, B.C., 2nd July.—The agent, Mr. W. H. Clark, promises to go ahead with the work; he informed me that he had never been instructed how to set and read the thermometer. The screen is on the north side of the station and the rain gauge is well placed on a post in centre of a grass plot. I fully instructed him on the reading and setting of thermometers and registering the rainfall.

Donald, B.C., 3rd July.—Mr. Redgrave gave up observing last October owing to a misunderstanding with the central office as to his reports. He has turned the work over to Mr. Cummings, a bailiff, who is, however, continually absent from Donald, and then deputed Mr. Blythe, assistant engineer, Canadian Pacific Railway, to do the work. Mr. Blythe told me that for months he had filled up forms to be sent to Toronto by Mr. Cummings and was astonished when I informed him they had not been received. I recommend that Mr. Blythe have charge of instruments. The thermometer screen is on the north-west side of the court-house, which exposure is far from good.

Banff, N.W.T. Visited summit of Tunnel Mountain, where it has been suggested there should be an anemometer; consider exposure fairly good, and results would probably be useful and instructive.

Medicine Hat, N.W.T., 5th July.—Remained over at this station, having had word from Toronto that the barometer seemed to be reading too low, and I wished to leave with Mr. Driman a spare barometer which I had brought away from Prince Albert. Comparisons showed that the barometer had remained unchanged since my previous visit in June.

Maple Creek, N.W.T., 5th July.—The C.P.R. agent, Mr. Pidgeon, agreed to take observations of maximum and minimum temperatures and rainfall. I therefore put in position a thermometer screen and rain gauge that had been sent from Lethbridge and gave full instructions in observing.

Swift Current, N.W.T., 6th July.—I again visited this station, in the hope that Mr. Knight would be ready to remove from his old quarters to some new rooms in an annex to his house in course of erection during my former visit. He was not ready, however, and I further cautioned him as to care necessary in removing barometer to its new position. Anemometer was working satisfactorily.

Virden, Man., 7th July.—Rev. Mr. Watts had not been observing for some time past, but promised to begin again; he is quite an enthusiast and would like to have a self-registering anemometer, for which there would be good exposure on the top of his house. During the frosts in August last year Mr. Watts took much trouble in making observations of temperature in different exposures and situations in the surrounding country.

Minnedosa, Man., 9th July.—Acting on written instructions from the director, I again visited this station to finally decide on a new position for the instruments. In future the temperature observations will probably show more nearly the temperature of the surrounding farm lands.

Winnipeg, Man., 10th July.—Things are as they were at my last visit, Mr. Richardson still being in charge. Gave instructions that the thermometer fence and screen be removed to the outside of yard, ten yards from either of two fences. This change will be an improvement and will entail no additional work, as with a small gate cut in the yard fence it will be directly on road to the rain gauge, which observers should visit at each observation.

Port Arthur, 11th July.—Mr. Cook reports that the signal mast should be removed to some higher ground in the town; at present masters of ships complain that the signal lanterns cannot be distinguished from the electric lights in the town; by removing the mast to the vicinity of the new custom-house, the lanterns would be raised well above the city lights. The custom-house in course of erection will completely shelter the anemometer in its present position from northerly winds. I therefore suggest that the instrument be removed to the top of the new building and the wires led to Mr. Cook's office, distant about 200 yards.

At Victoria, B.C., I called on Mr. James R. Anderson, of the Agricultural Department, asking for information as to what had been done towards obtaining observers at outlying stations in British Columbia. He gave me the names of men

likely to be willing to assist at the following points, viz., Chilcotin, Vernon, Nelson, Clinton, Princeton, and Lac la Hache.

Mr. Sharpe, at Agassiz, informed me that Mr. Eustace Smith, manager of Lord Aberdeen's farm at Okanagan Mission, would like to take observations if provided with instruments.

Owen Sound, 14th July.—The new mast at this place seems to be a thoroughly good job.

Goderich, 2nd October.—The signal mast at this station rotten at butt. Signal house in bad repair. Halyards will last balance of season, not longer. Recommend that next season a new mast and signal house be erected. Mr. Campbell, the agent, will probably do the work cheaper and as well as any one. The cone required some repairs, for which Mr. Campbell had already obtained the necessary stuff. The rain gauge is well located, and the anemometer in good order.

Bayfield, Ont., 1st October.—Was agreeably surprised at the state of affairs at this station. The mast, which is of cedar, is in good state of preservation. Signal house in good order; in it there is ample room for work. The roof opens in two parts, and signals are lowered direct into the shelter. Mr. Gardiner, jr., who has charge of this work, reports little difficulty with lanterns. The drum required some mending, which will be done in Bayfield. New halyards will be required next season.

Kincardine, 3rd October.—Signal mast and house in good shape; new cone required; halyards will last balance of the season. Dr Martyn very backward in sending in his returns, but the observations have been taken with regularity during the summer. Thermometer screen very badly exposed. Rain gauge also badly placed. Ordered a radical change in the position of these instruments.

Saugeen, 4th October.—Anemograph had not been working well; put it in good order; other instruments all right and well looked after.

Presque Isle, Ont., 5th October.—Anemograph had not been working for some months; put it in good order.

Oakville, Ont., 29th March.—It having been found necessary to move the signal mast to a new site, this station was visited with that intention, when instructions were also given for repairs to the mast.

Norwood, Ont., 11th April.—The instruments at this station were found fairly well exposed, but the anemometer and wind vane were much worn; accordingly instructions were given to return them to store.

MAGNETIC OBSERVATORY,

TORONTO, 29th September, 1893.

The Honourable
The Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit herewith the report on this observatory for the fiscal year ended 30th June, 1893.

During the above period the six daily magnetic and meteorological eye observations taken at 6 and 8 a.m., 2, 4, 10 p.m., and midnight, have been continued as in former years. On Sundays the hours of observation are 8 a.m. and 2 p.m., in addition to the night observation for the weather service. Absolute determinations of the magnetic elements have also been made. The self-recording declination, bifilar, and vertical force magnetographs have been kept in operation, as also the barograph and thermograph.

Hourly measurements of the curves have been made and the results abstracted. We have now twelve years of hourly readings tabulated; the daily and hourly means of which have been obtained; eye observations to check the photographic records have been made three times a day, the agreement being satisfactory. On the 8th of May the magnetic clock was dismantled, cleaned, and a new spring attached to the pendulum; since then it has worked very satisfactorily. The thermograph clock was also dismantled in December and cleaned. The stop shutter which had been working a little erratically was also cleaned and adjusted. Owing to an accident, the wet bulb thermograph thermometer got broken last August. It was replaced by the auxiliary thermometer (2097) that came from England when the instrument was first sent out. I hope in a short time to have enough observations to determine its scale value, which will not be far astray from the dry bulb thermometer's scale.

The most important magnetic storms occurred on July 12, 13, 16 and 25, August 12, October 17 and 18. The declination needle on July 16 altered over 2°25' in less than fifteen minutes.

The removal of the old carpenter shop and the extension of the new fence has added considerably to the appearance of the grounds.

TIME SERVICE.

During the year 29 solar transits and observations of stars in the meridian for time on 107 days were taken at the Toronto observatory, in which 575 stars have been observed. The positions of the stars as given in the "Berliner Jahrbuch" have, as formerly, been used in the reductions.

Determinations of the collimation error of the transit instrument have been frequently made, chiefly by micrometrical measurements on the cross wires in the collimating telescope.

The exchanges of time between the observatories at Montreal, Quebec, St. John and the Toronto observatory have taken place as usual, the comparisons being registered on the chronograph. The errors of the clock at Toronto and the different time pieces used by the observers being computed from the latest observations.

The examination of the clock and chronometer comparisons and observations for time sent in from the observatories at Quebec and St. John has been performed.

The following table shows the difference between the time by "Standard Observer," and that given at the various exchanges. The sign + indicates that the

time as sent from the various observatories is faster than that by the "Standard Observer":—

	Toronto.	Montreal.	Quebec.	St. John.
1892.				
July 6th			Sec.	Sec.
do 26th			+1.08	+0.86
do 27th			-0.03	-1.16
August 24th			-0.42	-1.96
do 31st			-1.07	-1.13
September 21st			-0.36	-0.65
October 21st			-0.42	-0.96
November 11th			-0.78	-0.78
do 30th	+0.21	-0.21	-1.20	-3.29
December 16th	+0.13	-0.13		+0.93
do 20th			+0.60	
1893.				
January 17th				+1.10
do 18th	-0.11	+0.11	-0.02	
February 8th	+0.31	-0.31	+0.04	+0.29
do 24th	+0.45	-0.45	+0.70	
March 2nd				+0.09
do 24th	+0.40	-0.40		+0.01
do 28th			-0.20	
April 13th	+0.11	-0.11	+0.13	-0.60
do 28th	+0.02	-0.02	+1.42	
May 10th	+0.12	-0.12	-0.80	+0.26
do 31st	+0.16	-0.16	+0.12	-1.08
June 21st	+0.40	-0.40	+0.29	+0.32
do 30th	+0.21	-0.21	0.00	-0.02

* During the repairs to the Montreal transit pillar, time was given by the Toronto observatory on the following dates, viz.: July 2nd, 5th, 8th, 13th, 16th, 20th, 23rd, 26th; August 1st, 5th, 16th, 20th, 24th, 31st; September 6th, 21st, and October 6th, 1892, after which the regular exchanges went on.

Time has also been given to Halifax on the nights of exchange of time with the other observations.

I have the honour to be, sir,
Your obedient servant,

CHARLES CARPMAEL,
Director.

TIDAL SERVICE.

TORONTO, 28th September, 1893.

The Honourable
The Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to report that early in July I secured the services of Capt. B. Douglas, R.N.R., to assist in the work of erecting gauges and in other work connected with the service.

Capt. Douglas joined me at Quebec on 16th July, and we proceeded by the Government ss. "Alert," and arrived at South-west Point, Anticosti, on the 26th July.

After together examining the site which I had selected in the previous year, we agreed that it was the most eligible that could be chosen, that it was capable of being made safe with certain appliances, and the expenditure would be less than at any other site.

The column and other materials for the erection of the gauge were landed, and with the assistance of two carpenters and some labourers, the gauge was placed and was in working order by the 12th of August.

On the 7th it blew hard from the north-west, a speed of 32 miles, and a very heavy sea rolling in, afforded a good test of the stability of the structure. But it stood well; the vibration of the column was slight.

Those who had experience of such work as well as those resident on the spot agreed that the structure as placed was secure, but as will be seen later, these anticipations were not verified.

Leaving South-west Point on the 12th August we proceeded to St. John, N.B.

Here the dispute between the city and steamboat company concerning the right to the wharf was still unsettled and I was compelled to select a new site.

Under the advice of the harbour master, Captain Taylor, and the engineers to the corporation, we selected a site in the north-east corner of the warehouse on Reed's Point wharf in preference to one I had inspected outside the warehouse, and where the gauge recently erected now stands, but at that time the harbour master considered it was not eligible, owing to its being exposed to danger of injury from ships' lines and hawsers.

Under my instructions, plans and specifications were prepared upon which tenders were invited from the contractors in St. John undertaking works connected with the building of wharfs and jetties.

The contractors likely to send in tenders were seen, and the work proposed was fully explained to them. We then proceeded to Grindstone, Magdalen Islands, where we arrived on 23rd August.

During our stay an excellent site for a tide gauge was selected at the east end of the breakwater built by one of the leading merchants, Mr. Leslie. A plan and specification of the work to be done were prepared, tenders for which were invited by Capt. Douglas on his arrival at Pictou.

We left Grindstone on the 30th August and I instructed Capt. Douglas to proceed to the Island of St. Paul's, Cabot Strait, and see if he could find a suitable site for a gauge, and then to proceed with the erection of the gauge at St. John, N.B. I myself landed at Souris, P.E.I., which I found would be a suitable place for a gauge.

Captain Douglas found St. Paul's a very difficult place to visit and much time was lost owing to his having to wait for the ss. "Harlaw," the only steamship calling there; it was therefore the 9th of September before he landed.

Mr. Campbell, the superintendent of St. Paul's, was a passenger on board the "Harlaw," and gave Capt. Douglas the fullest information respecting the island on the passage from North Sydney. Mr. Campbell and his son both rendered him every possible assistance in his examination of the only eligible anchorage and landing place on the eastern side of the island.

This little bay is called Atlantic Cove; another bay on the western side and less exposed to the ocean swell from the Atlantic is Trinity Cove, and it may possibly possess an eligible site for a tide gauge, but it is too remote from the superintendent's quarters at Atlantic Cove.

The distance across is about two miles over a very rough road. He therefore directed his attention to Atlantic Cove, and soon found an excellent site in a small cove. A good shelter from easterly gales and the Atlantic Ocean is afforded by the small rocky island running parallel and close to the shore of the main island. The depth of water at low water springs is three feet, but that can be increased by one or two feet by the removal of the loose stones and boulders on the bottom, and the foundation made level and secure thereby. The bottom is rocky with very little deposit of sand or silt, and that would entirely disappear in the fall when bad weather brings in heavy seas on the coast. The site is about 530 yards from Mr. Campbell's, the superintendent, house. The road is good, but from twenty or thirty yards from the level track to the face of the cliff above the proposed site a path protected by a hand rail and rough planking would have to be made at a small cost. From the edge of the cliff to the top of or side office, steps for descending would be required.

The column or shaft could be easily secured by crib work, and ballasted between the rocky island and cliff. The upper part of the shaft above high water could be

securely fastened to the cliff, which is solid and free from veins and fissures, by iron straps and eye bolts.

Captain Douglas returned to St. John, N.B., on the 14th September, and tenders having been asked for, the offer of Messrs. Beatteay and Thompson was accepted.

The site in the corner of the warehouse on Reed's Point wharf was opened and was found to be most unsuitable. Either the information I had received respecting it on my visit in August was incorrect, or the condition of the wharf and ballast floors had changed through the effects of the strong tides and deposits from landward. On carefully examining the nature of the bottom to a depth of 26 feet below the level of the wharf, and the accumulation of clay-like mud lying above the rocky substratum, Captain Douglas came to the conclusion that it would be wiser to abandon the site already chosen and select a fresh one. This was found in the south-east corner of the wharf, near the landing steps, but it was declared by the harbour master to be ineligible, owing to the danger from ships' lines and hawsers.

Captain Douglas having placed himself in communication with the mayor, Mr. Peters, the engineers to the corporation, and the harbour master, he obtained the necessary authority for placing the gauge there; permission was also given to remove the mooring post used by the shipping, which stood close to where the tide gauge is now placed.

After reporting this, tenders were invited, and that of Messrs. Beatteay and Thompson, at \$505, was accepted.

The work was a very difficult one to accomplish, as the gauge column had to be placed on the rocky bottom of the harbour in 53 feet of water at high water spring tides. The bottom was too hard to drive piles into; the wharf against which the gauge is placed is not in good condition; the rise and fall at springs is 30 feet, and the gauge column had to be heavily ballasted to counteract the floating power of 36 feet, which had to be perfectly water-tight.

The hydraulic pressure at high water at 36 feet in depth was very great, amounting to over 100 tons on the first yard, and bottom of the water tight column.

Considerable difficulty and some delay were experienced in making the column by additional inside beams sufficiently strong to resist the above pressure, but I am glad to report that the contractors fully and satisfactorily carried out the work.

At this stage Captain Douglas left for Anticosti on the 28th October and returned to St. John, N.B., on the 14th November, where he found the work nearly completed, but the gauge column needed protection from ice and small craft using the small dock steps. To effect this, strong sheet piling was placed to about 2 feet below the zero I used in placing the gauge.

Not having any levelling instruments and deeming it better to work in concert with the engineering staff of the corporation we sought the assistance of Mr. Hurd Peters, C.E., engineer in chief to the corporation, to fix a bench mark on the granite foundation of the custom-house in connection with the gauge. Mr. Peters cordially performed this duty.

On the 1st October a very hard gale from the north-west brought in an unusually heavy sea at South-west Point, Anticosti, which washed away the beams and other fastenings of the gauge column; as well as a large quantity of stone ballast used in the foundation of the work, and as a protection from the outside.

Miss Jessie Pope, who was in charge of the gauge in the absence of her brother, Mr. Herbert Pope, at the time it was wrecked, during the gale at great personal risk, saved the valuable mechanism in connection with the automatic gauge, and enabled Captain Douglas to bring it to headquarters after his second visit to Anticosti.

Captain Douglas visited South-west Point in November last and made a careful re-examination of the bay.

During the winter it was found that the eye reading gauge at St. John was not working satisfactorily and another form of gauge was substituted for it. This likewise did not work well and it was found that some one had dropped things into the well and almost choked it. The well was cleaned out and then worked satisfactorily.

It was found that it would be cheaper in re-erecting the gauge at South-west Point, Anticosti, to use an old boiler for placing the tide well in, than a wooden box

as before. While the necessary fittings were being made and the materials for the crib-work were being got together, Captain Douglas visited several points near Cape Rosier and found at Fox River a suitable position for a gauge. He then took the gauge, well, materials and workmen to South-west Point, and on 14th July Captain Douglas sent the following report:—

"I have the honour to report the successful completion of the work at this station, and that since the 11th instant I have been waiting transport from hence for my party and myself.

"My previous letters have duly reported to you the progress of the work, but for convenient reference it may be desirable I should state the nature of the structure now erected.

"The lower crib-work foundation was built of good sound spruce 12 inches square; 4 tiers of solid timber firmly bolted together formed the base; upon this the other tiers of similar construction were raised 1 foot apart.

"The interior of the work consisted of beams framed together forming the support to the angular breakwater. At the back of the lower crib there were two beams bolted outside the work as supports to long shores of heavy round timber placed against a rocky projection in the roof of the cave. These shores were fitted and bolted to the back of the crib foundation.

"The two six-inch iron pipes, six feet long, for the admission of water through the foundation to the roses, were placed in front of the breakwater, the flanges being close to the iron plates.

"The foundation thus built was placed in position in front of the opening of the cave, the sides of the hard limestone rock arched in such a manner as to key the foundation from above and below, whilst the narrower opening of the cave and the long shores before mentioned prevented the structure from being driven inwards; the whole work is thus firmly and immovably fixed, and the super-structure was raised upon it, each cross beam being fixed into the sides of the rock, which still arched over on both sides until the work narrowed from about 13 feet below to about 5 feet above.

"As each tier of beams was placed and firmly bolted through, heavy stone ballast, which had been previously blasted out, was packed into the spaces between the sides of the work and between the timbers.

"Sheet piling of 3-inch spruce was bolted to the outside of the beams, and at the angle of the the breakwater were two iron plates of $\frac{5}{8}$ iron, each 8 ft. by 3 ft. were firmly bolted to the beams one above the other with the 3-inch planks between. The upper part of the work was further secured by beams morticed into the rock, and fastened by iron eye bolts let into the surface of the rock and heavy cross bolts.

"The office or gauge house was placed on a solid mass of timber bolted down to the work below.

"The boiler was partly let into the north-west side of the rocky wall; the rock was chiselled out to fit the curve of the boiler.

"In front of the work, the top of the breakwater was decked over with 3-inch planks firmly secured by a heavy iron strap bolted to the beams.

"The office was very strongly made to be proof against the spray, there being an outer thickness of 1-inch planking 3 feet high on three sides.

"I purposely left open the blow hole above the cave to provide for the escape of the air driven into the cave from outside by the action of the waves in bad weather. And the south-east side of the rocky ground near the gauge was kept clear so as to give a free fall to any heavy seas washing over the breakwater.

"Both the Sir William Thompson and the eye observation gauges were placed similarly to those last year.

"The work was hardly completed, in fact the gauges had only been placed on the previous evening, the 8th inst., when the weather became very threatening; on Sunday, the next day, a very strong gale set in from the north-west bringing in a heavy sea from the gulf. The seas broke over the breakwater, sending the spray in showers over the roof the gauge house. I watched the place carefully and was much gratified to find the structure stood well.

"The heavy seas striking on the work and acting on the air in the cave sent a very strong draught through the flooring, the opening in the rock near where the gauge stood last year not being sufficient for its free escape. Possibly the iron six-inch pipes through the crib foundation let in the water too freely and gave a more direct action to it than the mere interstices in the sheet piling and the sides of the work would, but it was necessary to provide for the freer escape of the confined air, as it caused a considerable amount of vibration which affected both gauges.

"During Monday, the 10th, there was a good deal of sea, but it moderated towards night and became smoother.

"Six $2\frac{1}{2}$ in. holes were bored into the south-east side of the planking below the gauge house. This had the effect of reducing the vibration very considerably.

"On Tuesday 11th inst. another very strong gale set in from the north-west bringing in a heavier sea than we had on the 9th. The seas made a complete breach over the work, and the spray at high water went fully six feet over the top of the gauge house, but everything stood well. There was not a single evidence of any weakness or fault in the structure.

"The weather moderated towards evening.

"The diplidescope has been placed in position, and having tested it, I believe it is within 30 seconds of being correct. Mr. Pope has been instructed in its use; he considers it will be of great service to him in keeping the gauge clock correct in time.

"It affords me much pleasure to bring under your notice the intelligent and zealous assistance I have received from Mr. Pope, and I have also to record the good conduct of my party of six men from Gaspé.

"Meanwhile, the preparatory work in connection with the gauges at Grindstone, Magdalen Islands and St. Paul's Island have been put in hand, and these as well as that at Lévis will it is hoped be working before winter, so that then we shall have five gauges working."

Next season the work of observing the tidal currents should be commenced, and short series of tidal observations taken at Fox River, Souris and some other stations to be yet selected.

I have the honour to be, sir,

Your obedient servant,

CHARLES CARPMAEL,
Director.

APPENDIX B.

THE QUEBEC OBSERVATORY,

QUEBEC, 11th August, 1893.

The Director,
Meteorological Service,
Toronto.

DEAR SIR,—In accordance with your request, I have to report that for the year ending 30th June, 1893, there has been no change at this observatory.

The sidereal and mean time clocks, through service, have become very unreliable when the time has to be determined from their rates. On those days of time exchange that I have had observations my time rarely differs as much as $1\cdot10''$ from Toronto, proving, if such proof was required, that the time is determined here with a high degree of accuracy. On those days of exchange which occur during periods of continued cloudiness, when observations were impossible and the errors were dependent on a previously determined rate, the result depends entirely on the reputation of the clocks. In July last, the 28th was the last possible observation previous to the exchange of the 31st; this determined a rate of $2\cdot17''$ losing for the sidereal and $0\cdot10''$ losing for the mean time, from which the error in mean time at time of exchange on 31st was determined. On August 1st observations were had proving that the sidereal clock had changed its rate to $1\cdot47''$ losing and the mean time to $0\cdot47''$ gaining, resulting in an unusually large error, particularly as the period covered was only three days.

I have done everything that has occurred to me to improve the rate of the mean time clock; first having moved the clock from the outside exposure of the transit room into the more uniform temperature of the main building; have had both clocks well cleaned, and during April and May last carefully compensated the mean time pendulum, in as far as it was possible with such discrepancies of rate, which do not depend on temperature, would allow.

The only thing which remains to be done is to have the mean time clock returned to its makers on the close of navigation here, and have it completely overhauled, as there is no one here that I would trust to do it. As the matter is one of great importance and a source of continued worry and anxiety to me I trust that you will authorize this.

I am, &c.,

W. A. ASHE.
Director.

APPENDIX C.

THE ST. JOHN OBSERVATORY,

St. JOHN, N.B., 31st August, 1893.

CHARLES CARPMAEL, Esq.,

Director of Meteorological Service,
Toronto, Ont.

SIR,—I have the honour of presenting the annual report of this observatory. Chief station routine of meteorological observations have been continued without change since my last report.

Time service has received careful attention; observations of stars with transit instrument have been made at frequent intervals. The clocks have been going as evenly as can be expected in these temporary quarters. Daily time signal has been given to the shipping and others by dropping time ball at 1 p.m. local time. The time ball as well as the storm signals are displayed from the temporary staff on top of post office building.

Tidal observations have been made since the erection and equipment of the tidal station at Reed's Point.

A new transit house has been built on the same site as before the fire; house has been considerably enlarged and otherwise improved. The time ball apparatus is about completed and is now being placed in position; the apparatus is on the same plan as previous to the fire, except it will be dropped by electricity direct from the clock room.

Some slight improvements are being made in the observatory office, customs building; the sidereal and mean time clocks will be enclosed in vaults. Staff for display of storm and flag signals has been completed.

I have the honour to be, sir,
Your obedient servant,

D. L. HUTCHINSON,
Director.

REPORT ON THE MCGILL COLLEGE OBSERVATORY, MONTREAL, FOR
THE YEAR ENDING 31st DECEMBER, 1893.

MONTREAL, 2nd January, 1894.

The Honourable
The Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to present the report on the McGill College Observatory, Montreal, for the year ending 31st December, 1893.

Meteorological Observations.—The regular meteorological observations, as particularized in the report of the observatory for the year 1888, have been carried forward without interruption. The daily and monthly results have been published in the *Montreal Gazette*, and the monthly summaries in the *Canadian Record of Science*.

Time Service.—Determinations of clock errors have been made by the observations of 725 star transits on 131 nights. The instant of mean noon has been given to the shipping on week days throughout the season of navigation. The automatic system of time signals in the city has been maintained, and the time has been transmitted by the railway and telegraph lines throughout the Dominion, as in former years.

The system of time exchanges with the Toronto Observatory has been continued with the following results:—The average difference between the mean time of the two observatories, on the 15 days on which exchanges were made, was 0.19 seconds, and the greatest difference on any one day was 0.41 seconds. The probable error of the time of one observatory, as compared with that of the other, at any instant, as determined from the comparisons of the year, is 0.15 seconds.

Longitudes.—The first reductions of the observations made by me in the summer of 1892 in connection with the determination of the longitude of the observatory, were completed in July last, and the results forwarded to the Astronomer Royal for combination with the results of the English observers.

The provisional values of the longitudes of the stations, as communicated by the Astronomer Royal, are:—Montreal, $4^{\text{h}} 54^{\text{m}} 18.7^{\text{s}}$; Canso (Hazel Hill), $4^{\text{h}} 4^{\text{m}} 41.3^{\text{s}}$; Waterville, Ireland, $0^{\text{h}} 40^{\text{m}} 9.3^{\text{s}}$.

Buildings.—During the summer the facilities for work in the observatory have been improved by the addition of a story to the building, and a better horizon has been secured for the Blackman telescope by the increased height of the tower.

General.—Owing to the alterations in progress in the building, it was necessary to dismount the telescope in the early summer, so that the observations on sun-spots have been interrupted. The telescope will be remounted, and the work again taken up early in the new year. It was also found impracticable to recommence the observations of soil temperatures during the year. The usual large number of applications from the public for information have been received and answered during the year.

Mr. E. Bolton, B.A.Sc., and Mr. James Stevenson, B.A.Sc., have been the principal observers during the year. From 1st January to 1st July Mr. Robert Bickerdike, jr., B.A.Sc., was engaged in the reduction of the longitude observations, and since 1st December he has been employed as computer in the observatory. Appended hereto is a summary of the meteorological results for the year.

I am, sir, your most obedient servant,

C. H. McLEOD,
Superintendent.

METEOROLOGICAL ABSTRACT

OBSERVATIONS made at McGill College Observatory, Montreal, Canada.—Height
C. H. McLEOD,

Number.	MONTH.	THERMOMETER.					* BAROMETER.			
		Mean.	† Devia- tion from 19 years means.	Maximum.	Minimum.	Mean daily range.	Mean.	Maximum.	Minimum.	Mean daily range.
1	January	4.08	-7.64	41.7	-16.4	12.81	29.9449	30.67	28.943	220
2	February	12.99	-2.58	40.8	-12.7	15.50	30.0611	30.866	29.296	365
3	March	25.25	+1.22	42.9	-0.3	14.52	30.0136	30.633	29.441	263
4	April	36.86	-2.88	60.8	11.9	15.96	30.0005	30.580	29.204	274
5	May	53.87	-0.47	84.8	34.9	17.43	29.8364	30.261	29.245	212
6	June	68.01	+3.26	86.5	53.2	17.90	29.9597	30.187	20.612	131
7	July	67.69	-1.14	87.1	52.0	17.66	29.8624	30.136	29.530	154
8	August	67.85	+0.89	90.0	48.0	16.38	29.9175	30.169	29.124	166
9	September	54.83	-3.63	76.5	38.0	15.74	29.9760	30.334	29.415	189
10	October	50.29	+4.89	72.0	25.0	16.59	30.0576	30.602	29.016	223
11	November	35.21	+2.78	53.5	8.8	13.48	29.9626	30.615	29.407	271
12	December	11.81	-6.76	41.0	-13.8	17.97	30.1009	20.882	29.345	339
13	Sums for 1893									
14	Means for 1893	40.72	-1.01			15.99	29.9744			231
15	Means for 19 years end- ing Dec. 31, 1893	41.73					29.9871			

* Barometer readings reduced to 32° Fahr. and to sea level. † Inches of mercury. ‡ Saturation 100. "—" that it has been lower than the average for 19 years inclusive of 1893. The monthly means are anemometer and wind vane are on the summit of Mount Royal, 57 feet above the ground and 810 feet

The greatest heat was 90.0 on August 11; the greatest cold was 16.4 below zero on January 11, and of the thermometer in one day was 40.3 on February 6; least range was 4.1 on April 15. The warmest mean temperature was 12.63 below zero. The highest barometer reading was 30.882 on December 14. relative humidity was 23 on May 12. The greatest mileage of wind recorded in one hour was 62 on January wind was 134.972. The resultant direction of the wind for the year was S. 60° W., and the resultant lightning without thunder on 5 days; lunar halos on 16 nights; lunar coronas on 5 nights; solar halos on December 3. On November 27, at 11 h. 47 m., there was a very sharp earthquake shock; its apparent

NOTE—The yearly means of the above are the averages of the monthly means, except for the velocity

FOR THE YEAR 1893.

above sea level, 187 feet. Latitude N. 45° 30' 17". Longitude 4° 54' 18". 55 W.—
Superintendent.

+ Mean pressure of vapour.	+ Mean relative humidity.	Mean dew point.	WIND.		Means velocity in miles per hour.	Sky clouded per cent.	Per cent possible bright sunshine.	Inches of rain.	Number of days on which rain fell.	Inches of snow.	Number of days on which snow fell.	Inches of rain and snow melted.	No. of days on which rain and snow fell.	No. of days on which rain or snow fell.	Number.
			Resultant direction.												
0475	81.3	0.1	S. 77° W.		14.8	57	34.0	0.10	1	22.4	16	2.49	1	16	1
0690	80.8	0.9	S. 71° W.		18.9	61	40.0	0.42	4	21.1	12	2.81	2	14	2
1150	77.5	19.4	S. 46° W.		19.6	54	41.0	1.28	5	6.1	9	1.97	0	14	3
1494	67.8	26.5	S. 43° W.		18.1	62	42.2	1.32	12	8.4	4	2.18	2	14	4
2856	69.7	43.0	S. 65° W.		16.6	68	41.6	3.36	19			3.36		19	5
5109	74.5	59.2	S. 40° W.		11.2	59	50.0	4.99	14			4.99		14	6
4884	72.6	57.9	S. 70° W.		12.7	61	58.0	4.59	16			4.59		16	7
5113	75.5	59.1	S. 89° W.		11.4	52	55.9	7.37	15			7.37		15	8
3345	77.4	47.5	S. 60° W.		12.3	54	49.0	2.40	12			2.40		12	9
2933	76.8	42.5	S. 43° W.		14.9	50	48.9	2.18	13	0.0	1	2.18	1	13	10
1619	76.3	28.3	S. 36° W.		16.9	65	34.5	1.31	11	5.8	12	1.97	5	18	11
0761	86.2	8.4	S. 80° W.		16.3	66	34.0	0.76	5	40.4	23	4.60	4	24	12
2536	76.4	33.3	S. 60° W.		15.31	59.1	44.1	30.14	127	104.2	77	40.91	15	189	13
												3.41		16	14
2500	74.4				* 15.21	61.3	45.7	28.18	133	122.6	82	40.14	16	200	15

§ For twelve years only. * For seven years only. " + " indicates that the temperature has been *higher*; derived from readings taken every fourth hour, beginning with 3 h. 0 m. Eastern Standard time. The above the sea level.

16.3 below zero on January 12. The extreme range of temperature was therefore 106.4. Greatest range day was August 11, when the mean temperature was 78.57. The coldest day was January 11, when the Lowest barometer reading was 28.943 on January 2, giving a range of 1.939 for the year. The lowest 29, and the greatest velocity in gusts was at the rate of 72 m. p. h. on January 29. The total mileage of mileage was 49.488. Auroras were observed on 28 nights; fogs on 5 days; thunder storms on 23 days; 10 days. The first snowfall of the autumn was on October 29. The first sleighing of the winter was on direction was N.E. to S.W. of the wind.

APPENDIX No. 4.

REPORT ON HYDROGRAPHIC WORK.

OTTAWA, 10th January, 1892.

WM. SMITH, Esq.,
Deputy Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit the following report of work done in the Technical Branch of the Department of Marine and Fisheries, in connection with Hydrographic Surveying and Tidal Observations during the past year.

TIDAL OBSERVATION WORK.

Mr. William Bell Dawson, civil engineer, has been appointed to take charge of this special work undertaken by the Department of Marine and Fisheries. He submits a very full report of all work done in connection with Tidal and Current Observations up to the present date, which I inclose herewith. (Inclosure "A.") A report of work done in this service while under the charge of Mr. Carpmael, prior to Mr. Dawson's appointment, will be found in Appendix No. 3, attached to his report as director of the Meteorological service.

HYDROGRAPHIC SURVEY OF ANTICOSTI.

This survey was not continued during the season of 1893:—The Lords Commissioners of the Admiralty having informed the Government in December, 1892, that they had received a report from Staff-Commander William Tooker, R.N., in charge of the work, of the progress made in the charting of the southern coast of Anticosti and adjacent dangers, undertaken at the request of the Canadian Government, and partly paid for by them; that Captain Tooker points out that he has only been able to complete the portion of the island from Table Head around by East Point to about ten miles west of South Point. As it is, however, on that part of the coast of the island that nearly all wrecks have taken place, and as the present survey shows that the rocks do not extend so far from the shore as marked on the present charts, their Lordships do not propose to continue the survey of Anticosti during the year 1893, especially as the surveyors in the "Gulnare" are urgently needed in the interests of Her Majesty's ships on the coasts of Newfoundland.

A statement of expenditure during the year 1892, and up to the 31st January, 1893, was submitted to the Lords Commissioners of the Admiralty showing a total expenditure of £4,122 9s. 11d., this department accordingly transmitted to the Admiralty one-half of that sum, being \$10,031.41.

The results of Captain Tooker's survey in 1892 have been embodied in the Admiralty charts, and especially in chart No. 1621 of the entrance to the River St. Lawrence.

THE HYDROGRAPHIC SURVEY OF THE GEORGIAN BAY.

This work was continued during the past season by Mr. Wm. J. Stewart, in the steamer "Bayfield." His annual report of progress is inclosed herewith. (Inclosure "B.")

A sum of \$15,696.08 has been expended on this survey between the 1st January and 31st December, 1893.

I hope that the coming season of 1894 will complete this survey.

HYDROGRAPHIC SURVEY OF THE BAY OF QUINTÉ.

The completion of the Murray Canal greatly increased the traffic, especially by steam vessels, through the Bay of Quinté, and it was found that the want of a chart of that bay, parts of which are very shallow, was a great detriment to navigation.

In compliance with strong representations made by ship owners to the department, a hydrographic survey of the bay was undertaken, which has been carried out during the past season under my personal supervision. The triangulation of the bay was effected on the ice during February and March, and the sounding was carried on between May and September, when the work was satisfactorily completed.

I engaged as a temporary assistant Mr. Thomas Drummond, D.L.S., C.E., and during the summer months Mr. F. A. Wilkin acted as sextant observer. I wish to record my appreciation of the entirely satisfactory manner in which both these gentlemen performed the duties intrusted to them.

This survey has been very economically conducted, only a small number of men being employed, and a steam yacht being hired for the summer season at \$10 per day, this sum including the services of two men.

The whole of the Bay of Quinté has been surveyed from the Murray Canal to Centre Brother Island, and the charts to be published will include the work done by the American Government between Kingston and Centre Brother Island, in connection with the Murray Canal.

It is proposed to publish the charts on two sheets of double elephant paper, on a scale of about 2,000 feet to an inch. These charts are now being prepared by the permanent staff of the department, and it is to be hoped will be ready for publication by the opening of navigation.

The total expenditure in connection with this survey has been \$4,271.37.

Respectfully submitted.

WM. P. ANDERSON,
Chief Engineer.

(Inclosure "A.")

REPORT OF W. BELL DAWSON, C. E.

SURVEY OF TIDES AND CURRENTS IN CANADIAN WATERS.

OTTAWA, 13th January, 1894.

W. P. ANDERSON, Esq., C. E.

Chief Engineer, Department of Marine and Fisheries.

SIR,—I have the honour to submit the following report with regard to the Survey of Tides and Currents in Canadian waters.

At the present stage which this work has reached, it may be well to begin by reviewing concisely the representations that have been made during the past years in bringing this matter before the notice of the Government; and the steps that have already been taken.

As long ago as the meeting of the British Association held in Montreal in 1884, the importance of publishing tide tables for Canadian waters, and the necessity of establishing stations for tidal observations was discussed. The Association adopted a resolution drawing the attention of the Government of the Dominion to the matter, and also appointed a committee to collect information and make representations to the Government regarding it. The committee consisted of Dr. A. Johnson, chairman; Professor J. G. MacGregor, of Halifax; J. B. Cherriman, of Toronto; H. T. Bovey, of Montreal; and C. Carpmæl, Director of the Meteorological Service. The Montreal Board of Trade were at the same time considering the question independ-

ently, and they concurred in addressing a strong memorial on the subject to the Dominion Government. Ship owners and masters of ships were also practically unanimous as to the pressing need for knowledge on the subject of the tides and currents.

During the following sessions of Parliament, petitions and presentations were made through the then Minister of Marine. In reply, this Minister stated that owing to the outlay on the Georgian Bay Survey, and the expedition to Hudson's Bay during the summer of 1885, the Government did not propose to take action in the matter of tidal observations at that time.

In January, 1886, a large deputation representing the British Association, and the Royal Society of Canada, with representatives of the Board of Trade of Montreal, waited on the new Minister of Marine (the Hon. G. E. Foster), and also on the Premier, Sir John Macdonald. The matter was favourably received and fully discussed; and in the official answer it was stated that while the Government was fully sensible of the importance of establishing stations for continuous tidal observations in Canadian waters, it did not propose at that time, owing to the large expenditure on surveys and explorations in other directions, to undertake the additional expense involved; it was, however, fully alive to the importance of the matter, and hoped in the near future to be able to carry out a work so necessary and useful to the commercial interests of the country.

On the return of the Hudson's Bay expedition, a new source of expenditure arose; as the Government undertook to pay half the cost of a re-survey, by the British Admiralty, of part of the Lower St. Lawrence. In the summer of 1887, however, Lieut. Gordon, R.N., who had been in command of the expedition to Hudson's Bay, was authorized to make some test observations at a few points by means of the tide-staff with a view to ascertaining how far the accepted tidal establishments were to be relied upon. These observations were taken at Georgetown, P.E.I., at Louisburg, C.B., at Pictou, N.S., and at Port Hawkesbury in the Strait of Canso. In his report on this work, Lieut. Gordon explains that the object of these observations was to show to what extent the means now in the hands of navigators for the prediction of the tides on the coasts of Canada were in error; and he finds the results to show, as far as they go, that the means of prediction are very imperfect, and in some cases (such as the Strait of Canso) actually misleading. While admitting that these observations were too few in number and too rough in their nature to found any conclusions on, Lieut. Gordon considers that the results certainly strengthen the opinion that the whole question of the determination of tidal constants should be taken up in Canada, and a number of stations established for taking tidal observations; as these would be of the greatest practical value to seamen. He further points out the special value which this work will have when completed, as it will enable an intelligent ship master not only to see at what time the tide will be high or low, but also to see at once how the tidal current is setting his ship, when once the currents are charted for the waters of the Gulf.

As Staff Commander Maxwell, R. N., was at that time carrying on the re-survey in the Lower St. Lawrence, his attention was called to the memorial of the committee of the British Association, and he was asked by the department to state the nature and extent of such tidal observations as he was making. His reply is to the effect that he was doing what he could to observe the tides and currents with the means at his disposal; but that they were confessedly imperfect, and were confined to a limited area, and did not necessarily establish any comparison with any other portion of the river. To do this work in a comprehensive way, he considers the most trustworthy method to be the establishment of self-registering tide gauges at various points in the River and Gulf of St. Lawrence; with one or more vessels from which to observe day by day the condition of the tidal streams under varying states of wind and weather.

Up to the time of the accession to office of Sir C. Hibbert Tupper, K.C.M.G., as Minister of Marine in the autumn of 1888, no steps had been taken to carry out the work in accordance with the representations made. As Lieut. Gordon had spent the summer of 1888 in navigating the waters of the Gulf of St. Lawrence, he ad-

dressed a report to the Minister based upon the further information he there gained, after carefully watching the effects of currents on his ship's course. In this report he expresses the conviction that until we have an exhaustive examination of the whole system of tidal movements, carried out on similar plans to those which have been made on the United States coasts, and on the coasts of Great Britain, we shall always be subject to an annual amount of maritime loss due to the lack of information in regard to tidal currents. He also points out that in the 18 years from 1870 to 1887, the aggregate loss was a little over 50 million dollars, or an average of \$2,782,000 per annum; and in the same period the loss of life has been 4,308 lives. A certain proportion of this loss of life and property is certainly due to imperfect knowledge of the currents; and if the number of narrow escapes of vessels from disaster or wreck were known, it would add a powerful argument in favour of proceeding with the work forthwith. He also adds that if we could only get a record of the narrow escapes, the delays, and the errors of position discovered when a fog clears away, no further argument would be required; but captains of vessels as a rule dislike to admit that they have been out of position; and dangers escaped are only remembered in a practical sense by giving the ship a little more offing the next voyage, when, if the weather is thick, it may be found that the ship is as far to the north as she was on the previous trip to the south. It is the more difficult under these circumstances to collect evidence on the subject. He is himself convinced, however, of the extreme desirability, if not the absolute necessity of proceeding with this work as soon as possible.

During the summer season of 1889 little was done of a practical character, beyond exploratory trips made by Lieut. Gordon and Mr. Carpmæl, with a view to ascertaining the best points for the establishment of tide gauges.

At the conclusion of the re-surveys in the Lower St. Lawrence with this season, the expenses of which were being shared by the Canadian Government and the British Admiralty, the time was regarded as opportune to make further representations as to the pressing need for information about our tides and currents. Accordingly, in December, 1889, a petition was addressed to the Minister of Marine and Fisheries which was drawn up by the Committee of the British Association, and the Royal Society of Canada, and was signed by 393 masters and officers of vessels, to the following effect:—

"We, the undersigned masters and officers of vessels engaged in the navigation of the Gulf of St. Lawrence and of the waters on the Atlantic coast of the Dominion of Canada and of Newfoundland, desire earnestly and respectfully to petition the Government and Parliament of Canada, that they would promptly take such steps as they may deem advisable to obtain as thorough a knowledge as possible of the currents in these waters, whether due to the tides or to any other cause, and to distribute amongst mariners the information obtained. We believe that the serious loss of life and property due to shipwrecks attributable to unknown currents during fogs or hazy weather may thus be greatly diminished. In such weather these currents are a cause of great anxiety and danger."

A further memorial was presented to the Minister by the Shipping Interest of Montreal, bearing the representative signatures of Messrs. H. and A. Allan, David Torrance & Co., H. E. Murray, Anderson McKenzie & Co., and F. W. Henshaw. This memorial points out the special deficiency in Canada of such information to mariners as is supplied by the Imperial Government in the British Tide Tables; which show not only the change in the depth of water due to rise and fall of the tide, but also supply very full information about the currents in the waters surrounding the British Islands, whether due to the action of the tides, or influenced by atmospheric causes. The annual wreck list is referred to, as showing the urgent need of similar information for Canadian waters; and as far as ascertained, ship-masters were unanimous in their anxious desire for information on the subject. The need of taking immediate action in the matter is urged, as the necessary observations will occupy some years, and every year before their completion will show its list of preventable wrecks.

This memorial was also heartily endorsed by the President of the Quebec Board of Trade. It was referred to Captain W. H. Smith, R.N.R., Chairman of the Board of Examiners of Masters and Mates, who has had thirty years' experience in the Atlantic service; and in reply he concurs in recommending that self-registering tide gauges be placed at all the prominent ports, and observations taken by competent persons.

About the same time a further communication was received from Dr. Johnson, on behalf of the Committee of the British Association, which reviews the representations already made by them. Amongst other reasons adduced, the rule of the Imperial Board of Trade is referred to. This requires all masters of ships to obtain a certificate of competency, and for this purpose to pass an examination; which examination, in the case of masters desiring a certificate for the coasting trade, includes a knowledge of the tides and tidal currents. The information enabling them to pass this examination is found in the tide tables published by the Admiralty. This is cited to show the need of obtaining data for Canadian waters on which similar information could be based. The recent re-survey of part of the Lower St. Lawrence under Staff Commander Maxwell, is also referred to; and his endeavour as far as time permitted him, to investigate the tides and currents in the part of the river in which he was at work; although he acknowledges his means to be limited and insufficient to establish comparisons with other points. The opinion of Captain Lecky, R.N.R., is also quoted from his work on "Practical Navigation." This work has received the approbation of the naval authorities of Great Britain and of the United States, and is supplied to the fleets of both these countries. In it he gives a list of 16 books which he says "may be considered absolutely essential to safe navigation in the present day, when the question of speed enters so largely into the calculation." His list includes the Admiralty "Tide Tables" and Gale's and Houghton's "Manual of the Tides and Tidal Currents" for the waters surrounding the British Islands.

COMMENCEMENT OF THE WORK.

In the following season of 1890 a practical commencement was made. It was proposed to make some further preliminary observations; to purchase a few tide gauges; and also to make available, as far as might be possible, some old tidal records for the years 1860 and 1861, which were discovered in the archives of the Hydrographic Office, formerly at Halifax. For these purposes a sum of \$2,000 was made available; and out of this amount a sum of \$1,654.96 was expended on the above objects.

The proposed observations were made by Lieut. Gordon at two points on the Atlantic coast of Nova Scotia; the object in view being to check the accuracy of the tidal differences between Halifax and other points along the coast, in order to make Halifax if possible a "port of reference" for the whole eastern coast of Nova Scotia from Scatarie Island to Cape Sable. This was the most important thing to do first, because of the hope that the records above referred to might prove a sufficient basis from which to compute tide tables for Halifax, which might serve in the meantime until a longer series of observations could be obtained. A further object in these preliminary observations, was to ascertain by the use of different appliances and methods, those which promised to give the best and most economical results. The details of this work and the descriptions of the appliances used are given in Appendix No. 16 to 23rd Annual Report, Department of Marine and Fisheries for 1890.

To ascertain the best form of tide gauge to employ, the most careful and exhaustive inquiries were made by the Minister, aided by the advice of Mr. Carpmel, Director of the Meteorological Service. The difficulties in the case were exceptional, as at most points any ordinary apparatus is liable to freeze up in winter, and so to interrupt the record; and further, on grounds of economy, it was considered impossible to employ skilled observers for this special work, at the requisite number of stations.

The tides themselves on the coasts of Canada, vary so much in their amount (from a height of four or five feet in the open Atlantic, to twelve and eighteen in the St. Lawrence River, and thirty feet and over in the Bay of Fundy) that a relatively large number of stations are required in order to follow their movements in any satisfactory way. In these circumstances a self-recording tide gauge, which will do the work of making the record of the tide day and night, with the least amount of supervision, is the most suitable and economical to use. To prevent freezing, and so to secure the record in winter as well as in summer, Mr. Carpmael made special inquiries and experiments which are referred to in his report of December, 1890. (Appendix No. 16 to Annual Report, Department of Marine, 1890). In making choice of the best form of tide gauge, Professor G. H. Darwin of Cambridge, the most eminent specialist on tidal questions, was consulted. He kindly gave his advice in the matter; with a view also to the reduction of the observations, and calculation of tide tables from them. The gauge finally decided upon was the one devised by Sir William Thomson, and three of these were accordingly purchased to begin with.

The records of the Halifax tides above mentioned were submitted to Mr. Edward Roberts, of the Nautical Almanac Office. Although there were breaks and imperfections in the record, he devised a special method of double computation by which these could be successfully overcome; and he was therefore able to report favourably upon them, and to recommend that tide tables should be computed from them. In making the calculations of these tides an ingenious and expensive computing machine was placed at the service of this department for a merely nominal fee. This machine was devised to facilitate the extensive tidal calculations made by the Government of India. In this way tide tables were prepared for Halifax, first issued for the year 1891, and since published annually by this department. These tables also contain tidal differences which make them available for all the important harbours on the eastern or Atlantic coast of Nova Scotia.

TIDE GAUGES, AND TIDAL STATIONS ESTABLISHED.

In order to decide upon the most suitable points at which to erect the tide gauges, the advice of Mr. T. C. Mendenhall, superintendent of the United States Coast Survey, was asked, which he kindly gave, and Mr. Carpmael also visited personally a number of localities along the Lower St. Lawrence and in the Gulf, at such times during the following season as his other duties would permit. At this time also the ill health and subsequent death of Lieut. Gordon, removed him from further participation in the work, and left it entirely on Mr. Carpmael's hands.

The points considered most suitable for the erection of the first gauges were Father Point, the south-west point of Anticosti Island, and the harbour of St. John, N.B.; and the sites which have been chosen for three additional gauges since purchased, were the Magdalen Islands, St. Paul Island, C.B., and the harbour of Quebec. For the purchase and erection of these gauges, an appropriation of \$10,000 was placed at the disposal of this department in each of the fiscal years of 1891-1892, 1892-1893, and 1893-1894, but the actual expenditure in the first two of these fiscal years was little over one-fourth of the appropriations voted.

The tide gauge itself consists essentially of a cylinder in an upright position, which is made to revolve by clock-work, once in 24 hours, and around this cylinder, a sheet of graduated paper is placed. The tide, as it rises and falls, causes a float to move up and down in a vertical pipe, which communicates by a suitable opening with the sea. This float is connected by a fine wire with the wheels and gearing of the gauge, in such a way as to cause a pencil to move up and down along the cylinder, in exact accordance with the movements of the tide, but with a much reduced range. The combined effect of the motion of the pencil and the rotation of the cylinder, is to trace on the paper an undulating curve which represents the tidal wave itself on a reduced scale. From this curve the height of the tide, the times of high and low water, and all the other elements required can be measured. Also as high water is an hour later each day, the curves showing the tides on successive days

will fall behind each other, and the gauge may therefore be allowed to go on making its record for a week on the same sheet without confusion of the curves. A longside of this recording gauge a "sight-gauge" is placed to check the record on the other, and also to furnish a datum from which to measure the height of the tide. For this purpose there is a second vertical pipe, and a float with a staff upon it, which moves up and down with the tide itself. If the range of the tide is great, a steel tape passing over a pulley is used instead of the upright staff. The readings of this staff or tape need only be taken twice a day at convenient hours, and the corresponding points marked on the continuous record.

In placing such an appliance in position to record the tide, it is evidently necessary to secure the whole range of the tide within the vertical pipes. On ordinary beaches this can only be done by setting the whole appliance out in the water beyond the line of low tide; or else by placing it on shore and leading the tide to it by a trench or piping. It is this that occasions the chief expense in erecting the gauges in positions where there is no wharf already available, against which the gauge can be placed. The vertical pipes require to be surrounded by an open space in which heating is supplied in winter to prevent freezing, and their connection with the sea is made by means of a rose of small holes, so arranged as to reduce or efface the motion of waves within the vertical pipes.

In establishing the tide stations above mentioned, it was sometimes necessary in order to obtain the whole rise and fall of the tide, to construct a small crib of timber, and on this a small tide-house was placed to protect the instruments from the weather. These stations were erected under the immediate supervision of Captain Douglas, R.N.R., and their establishment often called for much judgment in meeting with practical difficulties which arose, and in taking advantage of local features to obtain sufficient shelter, in order to provide against their destruction by the ice, and the severe gales of the winter season. It will be unnecessary to describe the stations in detail beyond giving the following list of them, with the observers in charge, and the time during which they have been in operation to date.

TIDE GAUGE STATIONS ESTABLISHED UP TO DECEMBER, 1893.

St. John, N.B.—Gauge placed against wharf in harbour. D. L. Hutchinson, meteorological observer, in charge. In operation since December, 1892.

South-west Point, Anticosti.—Crib erected for gauge. H. Pope, lighthouse-keeper, in charge. Observations commenced July, 1893.

St. Paul Island, C.B.—Gauge on a crib built into an opening between rock cliffs. John Campbell, lighthouse-keeper, in charge. Observations commenced September, 1893.

Magdalen Islands.—At Grindstone, on east side of the islands. Gauge in a well in a timber breakwater for better protection. A. Le Bourdais, local superintendent of telegraphs, in charge. Observations commenced October, 1893.

Quebec.—Gauge placed at the Lévis Dry Dock. U. Valiquet, engineer of Dry Dock, in charge. Observations commenced November, 1893.

Father Point.—(Unfinished.) Gauge to be placed in a well sunk on shore, and tide to be led to it by a trench and piping.

TIDES.

In the interests of shipping, the investigation of the tides has in general, three aspects: (1) The times of high and low water at the principal harbours of the country, and the range of the tide. (2) The times of high and low water at the smaller ports along the coasts, and the depth of water on shoals and bars at their entrances; in which the coasting vessels are specially interested. (3) The effects of the tides in producing currents. In this last respect the Lower St. Lawrence, the Bay of Fundy, and the inlets on our Pacific coast, are amongst the most noteworthy examples to be found anywhere. As regards high and low water, the aggregate interests of the coasting trade are probably as great as those of our few principal harbours.

In the St. Lawrence River itself above Quebec the tides have been observed for some time in connection with the work of improving the navigable channel of the river, carried out under the direction of Mr. Kennedy, Chief Engineer to the Harbour Commissioners of Montreal. Tide tables are now published by him for the use of the river pilots; and a signal station has been established to indicate the depth of water in the new channel. A detailed account of these tides is also given by Mr. R. Steckel, C.E., of the Public Works Department; which is based upon observations taken while carrying out his system of levelling operations. The results are given and fully illustrated in his Report of December, 1891, addressed to Mr. L. Coste, Chief Engineer of Public Works.

In the river below Quebec, throughout the Gulf of St. Lawrence and on the Atlantic Coast, the tidal information which we possess is still based on Admiral Bayfield's survey of nearly 60 years ago; and these data, as the Hon. G. E. Foster recognized while Minister of Marine, are not sufficiently accurate for the present time.

To obtain the required information, tidal stations must be established at commanding points, in order to follow the general course of the tides; and from these the local differences for the smaller ports can afterwards be determined. In the choice of the main stations, the chief difficulty is that the large harbours are often the least suitable to use as stations from which to determine the tidal differences of other points along the coast. The reason for this is, that many harbours such as Quebec, St. John, N. B. and New York, are at the mouths of tidal rivers; and this has the effect of complicating the times of the tide with local conditions. To avoid this difficulty, Sandy Hook has been chosen instead of New York harbour, as a point of reference for other places along the Atlantic coast. At Quebec and St. John, the same local difficulties occur; and although it is necessary to observe the tides at these harbours on account of their own importance, it is doubtful whether St. John will answer satisfactorily as a port of reference for the Bay of Fundy. On this account it is advisable to establish an additional tide gauge as soon as possible at Yarmouth, which is the best available point. It is free from local influences, and the tides have a more medium range than at St. John, making results more reliable, and it best commands the entrance to the Bay of Fundy, as the tides enter the Bay from the southward. For the Atlantic coast of Nova Scotia, Halifax is undoubtedly the locality to select, as it has the advantage of combining both the objects referred to. It is a question however, whether it would be best to place the gauge in the harbour of Halifax, where the influence of the accumulated tide in Bedford Basin may have an appreciable effect. It may be found on examination that a point outside the harbour, such as Chebucto Head, may give better results for the actual tide of the Atlantic.

In recommending the establishment of a tidal gauge at Halifax, it may be well to explain that to obtain a satisfactory basis for tide tables at so important a point, the observations should be continued for a period of 19 years. This is the period of revolution of the moon's nodes, and the period in which eclipses recur successively in the same order. Although there is a recurrence in each year of unusually high tides at the equinoxes in the spring and autumn, due to the combined influence of the sun and moon at those seasons, yet the declination of the moon is different at each succeeding equinox until the period of 19 years has elapsed. At the end of that time the sun and moon are again in positions with respect to the earth which are practically identical with those which they had at first; and the whole of the associated phenomena, including the tides, recommence again in the same sequence. This is therefore the shortest available lunar cycle for the correct computation of tides at any standard point.

As the Gulf of St. Lawrence forms a large area which is nearly land-locked, it is of the first importance to obtain complete information regarding the tides and currents at the two main entrances which connect it with the ocean. The northern entrance by the Strait of Belle Isle is only about 10 miles wide and 40 fathoms deep while the other opening between Cape Breton and Newfoundland, known on the charts as Cabot Strait, has a width of 60 miles and a depth over the greater part of this extent of about 250 fathoms. In comparison with these the Strait of Canso need

not be taken into account in its relation to the tides and currents of the Gulf as a whole; but with regard to these two main entrances themselves, it must not be taken for granted that their influence depends solely upon their relative dimensions. Judging by the movement of icebergs in the Strait of Belle Isle, the general opinion is that a large amount of cold water finds its way through it into the Gulf. This may be in reality a branch of the Arctic Current on its way south from Baffin's Bay. Although this entrance to the Gulf may seem unimportant as compared to the other, it should be remembered that a current of even half a mile an hour through this Strait would admit to the Gulf a volume of cold water more than 20 times greater than the volume discharged by the river St. Lawrence.

As regards tide however, there is little doubt that the amount entering the Gulf by the Strait of Belle Isle is relatively very small; but owing to the nature of tidal undulations, it is quite possible that its effect may be felt further than at first sight would seem likely. In addition to this, the tide is sure to have a direct influence on the movement of the current in the Strait. It is therefore necessary to establish a tide-gauge there as soon as possible. The best position will probably be at Forteau Bay, where there is a wharf and good shelter. This bay is also at the narrowest part of the Strait, where the currents can best be observed.

The main tide found in the Gulf undoubtedly enters by Cabot Strait (between Cape Breton and Newfoundland) from the general tidal wave in the Atlantic, which advances from the south-east. It is a remarkable fact that the tidal wave which enters here, does not lose itself in the great expanse of the Gulf area, but is again found with a range even greater than before in the passage between Gaspé and Anticosti, and from there continues its course, with ever increasing height, up the St. Lawrence to Quebec. This is well illustrated by the curves already recorded by the tide-gauges. The progress of the tidal wave in this leading direction, must be largely due to the existence of a deep channel, which crosses the whole extent of the Gulf from Cabot Strait to the passage referred to, between Gaspé and Anticosti; and thence extends up the St. Lawrence nearly to the Saguenay. This channel thus extends for a distance of 500 miles, with an average width of 35 miles, and a continuous depth of over 150 fathoms. It is this channel which forms an avenue of least assistance for the progress of the tidal wave.

This will explain in general the reasons for the positions chosen for the tide gauges. It was evident that observations at some point in Cabot Strait would furnish a key to the situation; but the rocky cliffs on both sides at Cape North, and Cape Ray, and the rocky character and exposed situation of St. Paul Island, made it appear impracticable to place a tide-gauge there. In locating the gauge on the Magdalen Islands, however, although it was placed on their eastern side, it soon became apparent that the tidal wave had already lost its full range in the expanse of the Gulf. A careful examination was therefore made to find if possible a position on St. Paul Island sufficiently sheltered to protect a gauge from destruction. The sheltered site at which the gauge now stands, was eventually discovered; and observations in Cabot Strait itself are thus secured.

On the main line of the progress of the tidal wave from St. Paul Island to Quebec, a distance of 650 miles, the intermediate tide stations which have been selected as most suitable are the South-west Point of Anticosti Island, and Father Point. These two points have the following important advantages: They are near to the edge of the main channel above described, which traverses the Gulf; and they are similarly situated with regard to it, as they are both within six or eight miles of the 100-fathom line; they are both situated on the open coast, where they are unaffected by such local conditions as might exist in a bay or inlet. On these grounds they are admirably adapted to follow the progress of the tide and serve as reference stations. The only position that can claim superiority to Father Point as commanding the mouth of the St. Lawrence, is Point des Monts on the north shore; as this stands more truly at the dividing line between the River and the Gulf. Against this, however, Father Point has the practical advantage of being the Pilot Station, where direct information regarding tides and currents is of the first importance and can be made directly available.

In this chain of tidal stations an important region is still omitted. The line of the main channel across the Gulf from Cabot Strait to Gaspé, is very direct with only a slight bend to the north-east in passing the Magdalen Islands. This main channel thus forms the deep water edge of the large semi-circular bay of comparatively shallow water, which is bounded by the wide sweep of coast from Gaspé along New Brunswick to Cape Breton; and in which Prince Edward Island lies. The depth of water throughout this bay averages only about thirty fathoms; and the tidal wave has to pass over an extent of about 200 miles of this shallow water to reach its shores. It is therefore most important to establish at least one tide station somewhere near the centre of the sweep of coast which bounds it. The position I would recommend would be in the vicinity of Miramichi Bay; as this is the point furthest removed from the deep-water and from the tidal entrance at Cabot Strait. The tide gauge now on the Magdalen Islands will give in a comparatively short time, a record sufficient to establish its tidal difference from St. Paul Island; and it can then be utilized for the more permanently important position at Miramichi. This change may therefore be made with advantage before the end of next season.

At Father Point the erection of the tide-gauge was not finished, up to the beginning of the present winter, when the ice stopped further operations. It is a position which presents much difficulty, as the gauge has to be placed above high-water mark to prevent it from being carried away by the heavy ice which drifts up and down the River with the tide. This necessitates the excavation of a trench 280 feet in length across a foreshore of shale rock to lead the tide to the gauge. On account of these difficulties the wharf at Rimouski, some six miles distant, was examined before the work was commenced. The dredging of the silt to deepen the water at this wharf has caused it to settle and there is no certainty that further settlement may not take place, which would interfere seriously with observations made by a gauge placed upon it. Also in winter, there is no one at the wharf in the employ of the Government to carry on the observations; and the employment of a competent observer for the purpose would be less economical than to make the expenditure required to establish the gauge at Father Point. The practical advantage of Father Point, as the Pilot Station, is a still more important argument in its favour. The erection of the gauge there, should therefore be completed as soon as possible next season.

To complete the number of principal stations for the tidal observations in accordance with the explanations above given, three additional tides gauges should be erected at Yarmouth, Halifax, and Belle Isle respectively; the station at Father Point should be completed, and the tide gauge on the Magdalen Islands should be removed to the vicinity of Miramichi Bay. I would recommend that this be done during the coming season in order that the stations may be in operation at the earliest possible date.

CURRENTS.

There are two ways in which marine currents may be classified. From the point of view of the main routes of navigation which traverse the Gulf and follow our coasts, they may be termed Speed Currents or Cross Currents, according as they assist or retard a vessel, or tend to carry it laterally out of its course. The Gulf Stream off the American coast affords an example on a large scale of a speed current; as vessels between New York and the West Indies can obtain a distinct advantage in time by following or avoiding it. On the other hand with reference to the causes which give rise to the currents, a distinction may be made between tidal currents and those produced largely or wholly by the wind. In this connection also, the relation between surface currents and under currents is important; as the wind may displace a surface current from its normal position, and thus allow the water beneath to replace it to a greater or less extent. There are other causes also, such as difference of temperature, which may bring an under current to the surface, or occasion a surface current to sink. It must not, therefore, be hastily assumed that information regarding under currents is of no practical use for the purposes of navi-

gation. In addition to these causes the height of the barometer may also have an appreciable effect on the movement of currents.

In illustration of the above points, some examples may be given from what is already more or less distinctly known or supposed to take place in the Lower St. Lawrence and Gulf; and these examples may also serve to show the nature of the information that it is so exceedingly important to obtain with at least some degree of certainty.

From Quebec to Father Point the tidal currents occupy the whole width of the River; and although they may class as speed currents, it is only the smaller sailing craft that take any advantage of them. The steamships take their chance of gain or loss and disregard them; although the direction of the current has to be considered in calculating time of arrival in port, and making railway connections. Where the River widens the case is different, as part of the width is occupied by a constant downward current which appears usually to run parallel to the south shore at no great distance from it, all the way to Gaspé. It is possible that this current may prove to be due in some measure to the warmer and fresher waters of the St. Lawrence river, which would naturally float to the surface; and its tendency to keep to the south side may be occasioned by the prevailing direction of the wind. There is also some reason to suppose that with severe or long continued south-westerly winds, this current is displaced from its usual course and made to set in against the south side of Anticosti. If this supposition is correct, it would help to account for the "Caution" found on the chart in this neighbourhood to the effect that "the currents are governed principally by the wind." A knowledge of the usual course of such a current, and the reasons for its change in position, would enable this vague caution to be replaced by some much more definite statement, to show mariners what they have actually to expect. In the part of the Gulf to the eastward of the Magdalen Islands and Anticosti, there are some indications that the surface water has a movement in a north-westerly direction. If this movement is found to exist either permanently or at certain times, it will furnish an example of a cross current on the route of vessels coming inwards through Belle Isle. The tendency of such a current to set them to the northward of their course, would then help to explain why so many vessels in endeavouring to round the eastern end of Anticosti are wrecked on its north-eastern shores. The great importance of ascertaining the actual facts in such cases as these, is very evident.

There are other directions also in addition to the interests of shipping, in which a knowledge of the currents may be indirectly of practical importance. The good fishing grounds on the Atlantic coasts of Newfoundland and Nova Scotia and along New England are acknowledged to be due to the cold northern current which skirts these shores. It is generally believed that the cold water which enters at Belle Isle, floods the bottom of the Gulf in its deeper parts; and some knowledge of the extent to which this is the case, may throw light indirectly on the distribution of cold water fish in the Gulf area. On the other hand the oyster is found in the warmer waters of the Gulf, along the shores of New Brunswick and Prince Edward Island; although on the Atlantic coast it does not occur much north of Portland. The water is naturally warmest in the shallow parts which are least disturbed by currents; and the relation between the movement of the water and the temperature, may therefore have a bearing on the localities which the oyster prefers.

It is well known that the height of the barometer has an effect on the height of the tide. This is explained in general terms, by saying that the decreased pressure of the air allows the tide to rise higher than it otherwise would; as the difference in pressure of an inch of mercury corresponds to about a foot in the height of water. The amount of difference likely to occur in the actual height of the tide from this cause, is of little practical importance, except in the case of a harbour with a bar across its mouth. But the effect on the tidal currents may often be much more marked. For example, a low barometer over the Bay of Fundy with a rising tide can hardly fail to increase the velocity of the currents; and the amount of this increase ought to be determined. In land-locked areas such as the Gulf of St. Lawrence, the effect of the barometer is usually quite distinct, if we may judge by such

similar instances as the Baltic Sea and the Gulf of Mexico. With a high barometer over the area of that gulf, and a lower pressure over the ocean outside, the speed of the Gulf Stream is appreciably affected. The conditions are closely parallel in the case of the Gulf of St. Lawrence, when the low pressure area of a storm is passing over the outer banks, on the course which these storms usually follow. If this is also accompanied by a strong north-westerly wind across the Gulf, it is to be expected that a considerable volume of water will be driven out at Cabot Strait, by these two causes acting together, and that the general equilibrium of the Gulf will be disturbed.

On account of these effects of the changes in atmospheric pressure, the readings of the barometer are always recorded in connection with tidal stations. This is being done in all cases in which there is no neighbouring meteorological station which will serve the purpose.

TIDES AND CURRENTS OF THE PACIFIC.

On the Pacific Coast the principal harbours of Victoria, New Westminster, Vancouver and Nanaimo, are all situated on the straits or interior waters within Vancouver Island; and the tides and currents in these are very complicated in their character. As the Gulf of Georgia, which forms the largest of these interior waters, communicates with the Pacific both to the west and to the north, the tides enter from both these directions; and the tidal currents of the numerous sounds and inlets which open off the Gulf itself, are thus complicated with those of the entering tides. It will therefore be necessary to determine as a basis the tide in the open Pacific, where it is uninfluenced by the effects of the currents in the inlets. For this purpose the best point to select is probably Cape Beale on the westside of Vancouver Island. It is the most northerly lighthouse point on that shore, and furthest removed from the mouth of the strait of San Juan de Fuca; and the form of the Cape itself indicates a good shelter besides it.

In selecting a position at which to observe the general tide in the area of the Gulf of Georgia, it must be remembered that the object in view is chiefly to establish a standard to which the direction and time of change of the currents can be referred; just as the currents in the English Channel are referred to the time of high water at Dover. For the straits and inlets of the Pacific Coast, the speed of the currents, their direction and time of change, are fully more important to a vessel than the actual time of high water at the harbour to which it may be bound. With this in view, the harbours of Vancouver and New Westminster which open off the Gulf, are not likely to prove suitable for the purpose; on account of the disturbing influences of Burrard Inlet and the Fraser River. The position chosen should be on the open shore of the Gulf, where it would be free from such influences, and also from the tide-rips which occur at the mouths of the smaller channels. A position at or near Nanaimo would fulfil these requirements, and would also be centrally situated with regard to the area of the Gulf. It is probable that this will prove on the whole the most suitable position for a tide-station, to which the currents throughout these straits can be referred. It will serve at the same time as a reference station from which the tides at Vancouver and New Westminster can be determined.

The harbour of Victoria occupies an intermediate position between the outside tides of the Pacific and those of the interior waters of the Gulf. It would be well, therefore, to have a tide station at Victoria or Esquimalt to command the Strait of Fuca, and to serve as a connecting link between the outside and inside tides as found at the other two stations, as well as for the sake of the harbour of Victoria itself.

The northern navigation to Alaska must remain for some time to come in the hands of captains who have had the opportunities to acquire a local acquaintance with the tides and currents on that route. But for the principal harbours of British Columbia the three positions I have indicated will serve as reference stations for the tides and currents on the main lines of navigation. The tide gauges at these points

should be erected at the same time, to obtain the relation required between the observations.

In considering where additional tide gauges are first required and where the survey of the currents should be commenced, the relative needs in the interest of shipping should be kept in view. On the Pacific coast the currents themselves are on the whole stronger and more variable than those encountered by the same classes of vessels on our eastern shores. On the main lines of navigation, however, the pilots join the vessels at the entrance to the Strait of Fuca; and the vessels thus obtain the assistance of local knowledge from the outset, for the straits and inlets of that coast. In the Gulf of St. Lawrence, which is traversed on two different routes by trans-Atlantic vessels, the captains have to navigate its whole extent of some 600 miles after making land, before they reach the pilot station at Father Point. It is therefore advisable that the credit which may be made available for the purposes of this Survey, should be laid out during the coming season in completing on our eastern shores the number of tide gauges required, and commencing the survey of the currents. If these are completed this season, a corresponding outlay in the season of next year, to that now estimated for the establishment of tide gauges, would equip the Pacific coast with the gauges required to obtain a basis of reference for both tides and currents.

SURVEY OF CURRENTS.

The information obtained by means of the survey should be classed and described as (1) normal conditions, and (2) exceptional conditions and disturbing influences. The normal conditions of the Gulf of St. Lawrence during the season of navigation, are a fairly steady barometer and prevailing wind from the south-west; and some of the exceptional conditions already described may be taken as examples of disturbing influences.

Under the normal conditions then, the leading causes which produce the currents are the tides themselves and the force of the prevailing wind. It is therefore necessary that the winds and tides should be observed throughout the time that the survey of the currents is in progress. In recording the winds Mr. Carpmael will be glad to co-operate by equipping more fully any of the present observatories where this may be necessary. This survey will also afford another direction in which the numerous meteorological observations now taken, may be utilized for the practical advantage of seamen. When all the tidal stations which I have indicated are established, there will be five in the Gulf and Lower St. Lawrence without counting Quebec. These must be maintained while the survey of the current is being made, to furnish the tidal data required; and during that time it may also be possible to establish some of the tidal differences between the present stations with sufficient accuracy to enable one or more of the tide gauges to be removed and utilized at new positions. It is therefore most advantageous in the interests of the work as a whole, that the survey of the currents should be commenced at once. It will also prove more economical in the long run to do so; and there is the further practical advantage of obtaining as soon as possible information which is so much needed. I would therefore recommend that this branch of the work be commenced this season.

The records made by the tide gauges now in operation have already accumulated to some extent; and it is only at present that a beginning is being made in the direction of working up the results. With the commencement of the survey of the currents, the staff at work in the summer season, could be utilized in the winter months to work up the tidal observations of the whole year. This affords a further reason in favour of carrying on the two branches of the work together.

METHODS AND APPLIANCES.

With regard to methods and appliances, it will only be necessary at present to make a few general remarks. Marine surveys have received a great stimulus in

recent years from the "Challenger" expedition fitted out by the British Admiralty and from the investigations of the Gulf Stream by the "Blake" in connection with the United States Coast Survey. Much progress has thus been made in the appliances used; the use of the drift buoy for the measurement of currents has been largely superseded by the current-meter, although in some cases the older methods can still be used to advantage. The appliances devised for the "Blake" have made it practicable to anchor in depths ranging from 2,000 to 3,000 fathoms. It is of the greatest advantage to work from a vessel at anchor, as it affords a fixed point from which to determine the direction and velocity of the currents. This is especially important where the land is too distant to determine the direction and speed of a current by the drift of the vessel itself; and such determinations from drifting are in any case complicated with lee-way from the wind. The depths in the Gulf are not so formidable as those encountered by the "Blake," as they nowhere exceed 300 fathoms. For the survey of currents the use of a sailing vessel is found to be impracticable on account of the long delay in arriving at the spot where the observations are required and the impossibility of doing so in a calm, which is the very time when the observations would be the most accurate, the long time required to heave up the anchor by a hand windlass, and the danger to the vessel during this delay, if bad weather is the cause of departure. For these reasons it is necessary to have a steamer with steam winches, &c., which a few additional appliances would prepare for anchoring.

The observations should include the density and the temperature of the water, as well as the direction of the currents. The density is chiefly useful as an indication of its admixture with fresh water, either in the estuary or in the neighbourhood of melting icebergs. The temperature has always been found a valuable guide in tracing currents. In some situations it will be advisable to determine the under-currents also. The speed of the surface currents themselves, I propose to determine at a uniform depth of 10 feet, as this may be taken in general as half the average draught of a vessel. The speed, at this depth, will best show the movement of the body of the surface water, in relation to its effect in drifting a vessel.

In the coming season, I would recommend, as the most effective way to commence the work, that surveys be made of the two main entrances to the Gulf at Belle Isle, and at Cabot Strait between Cape Breton and Newfoundland, in order to determine the amount and direction of the currents that may be found to pass through these dominant openings. To do this work satisfactorily, observations should be carried on simultaneously at the two places, and should be continued for about three months, in order to secure the truly normal conditions of the currents, the effect of the difference between the spring and neap tides, and the disturbing effect of such exceptional conditions as may occur during that time. The under currents should be determined as well as the surface currents, so that the total amount of water which enters or leaves the Gulf area by these openings may be ascertained. The volume discharged by the St. Lawrence may also be taken into account, although a very slight movement of the waters at these large openings would more than make up for it. In this way some general basis will be obtained for the survey of the currents in the interior of the Gulf.

The sum required to carry out this work during the fiscal year 1894-1895 is shown in the estimate which I beg to append below; and I believe that to carry out the work as outlined and estimated in this report, is the most efficient and economical way of carrying on this Survey from the position it has already reached.

COMPLETION OF THE SURVEY.

The time required for the survey of the currents on both the Atlantic and Pacific coasts will be about six or eight years; on the basis of an annual expenditure as indicated, and the average annual cost should be fully covered by the amount of the present estimate; with the exception of the sum allowed for the use of the steamer, which in future years should be available for the full season. With this proviso, it will be possible in the time stated to survey the currents in the open waters traversed by the ocean-going vessels, and on the main routes leading to

our principal harbours; but it does not contemplate an examination in detail of the currents in the less important bays and straits. The amount of the estimate also includes the additional tide gauges to be established in the first two seasons in advance of the survey of the currents in each region. The margin corresponding to this in later years can be used to carry forward the tidal work, until the completion of the survey of the currents; when the remaining tidal work can be completed satisfactorily on the basis of a much reduced expenditure.

SUMMARY.

The following summary may be given in conclusion, with special reference to the work for the coming season:—

1. The representations made in past years have shown the imperative need of obtaining full information as to the tides and currents in Canadian waters; and this is now generally admitted and recognized.

2. A practical commencement has been made by the erection of five tide gauges now in operation, and also by the publication of tide tables for the port of Halifax by this department.

3. It is now proposed to complete the series of tide gauges required in the Gulf, and on the Atlantic coast; and also to commence the Survey of the currents in the Gulf of St. Lawrence.

4. The credit of \$10,000 voted by Parliament, was for the erection of tide gauges and the reduction of the tidal observations; and did not include provision for the Survey of the currents.

5. It may also be noted that out of the two annual credits of \$10,000 each, made available up to June, 1893, little over one-fourth was actually expended on the work.

I have, sir, the honour to remain,

Your obedient servant,

W. BELL DAWSON,

Engineer in charge of Tidal Survey.

SURVEY OF TIDES AND CURRENTS.

ESTIMATE FOR THE FISCAL YEAR 1894-95.

Three new tidal stations at Belle Isle, Halifax, and Yarmouth, including cost of tide-gauges and erection....\$	3,500
Removal of tide-gauge from Magdalen Islands to Miramichi, after nine months.....	900
Completion of gauge at Father Point.....	700
Maintenance of nine tidal stations, at \$300 each, including salary of observers	2,700
Publication of tide tables.....	300
Engineer in charge, salary	2,000
Assistant to supervise erection of tide-gauges, and three assistant surveyors and computers, for survey of the currents, and for working up the tidal observations.	3,600
Travelling expenses and field expenses of staff....	1,800
Hire of boatmen	900
Fittings for steamer, deep sea anchorage, sounding appliances, current meters, instruments, &c.....	2,500
Add for contingencies—say 5 per cent.....	1,100
	<hr/>
	\$ 20,000
Use of steamer for four months at the rate of \$15,000 for a full season of seven months.....	9,000
	<hr/>
	\$ 29,000

(Inclosure "B.")

HYDROGRAPHIC SURVEY OF GEORGIAN BAY.

REPORT OF W. J. STEWART.

OTTAWA, 31st October, 1893.

The Chief Engineer of the
Department of Marine and Fisheries.

SIR,—I have the honour to submit the following report upon the work of the survey of Georgian Bay for the season of 1893:—

On April 12th Capt. Boulton having relinquished command of the survey, I was instructed to proceed with it on the same general lines as adopted by him.

On May 4th the "Bayfield" with party of twenty-two officers and crew on board, left Owen Sound to take up the portion of the chart "Western Islands to Wabausheh," left unfinished by 1891. The work occupied my attention to September 12th, the whole time being used in sounding from boat and ship that portion of the north-east shore of the bay embraced between Hope Island and Moose Point and out to line four miles west of the Western Islands and four miles west of Christian Island. This embraces an area of 215 square miles in which 740 miles of boat sounding and 800 miles of ship sounding were done. Owing to the very uneven bottom, the very small rocks and shoals rising almost perpendicularly from the bottom and the dark water, the labour involved in examining the suspicious casts developed in the linear sounding was very great.

As a result of the careful examination of the various channels, it may be said that, did business warrant the expenditure, channels could be buoyed into various harbours, as we found necessary for the economical prosecution of the work. The "Bayfield," drawing 10½ feet water, used the inside channel continually, showing that by the aid of a few buoys, the local boats trading between Collingwood, Midland and Killarney could use this channel and avoid the heavy seas that often roll in between Hope Island and "the umbrella."

Although of little use for general navigation, the "Bayfield" used a new channel north-east of Giants Tomb Island and to the east of the Watchers.

Outside the shallow water that usually borders such islands and rocks, few shoals were found, in fact the shore is hardly as dangerous as is generally supposed, but several buoys should be placed on prominent shoals.

Around the Western Islands several very bad rocks were picked up, lying long distances from the dry rocks, and being particularly dangerous, because a lead would give no idea of their proximity and were a vessel to strike she would sink alongside in very deep water.

During the season I made two trips to Parry Sound, one to point out to the contractor the position for the new lighthouses, and the second to see if the lights were properly placed.

After completing the unfinished portion mentioned above, I turned my attention to Nottawasaga Bay and succeeded in extending the old triangulation of "Collingwood and its Approaches," first out to Point Cockburn and then to Cape Rich thus completing the main triangulation of the Bay. Next season will be fully taken up with the completion of the shore line of the same bay and the sounding of it.

With the close of this season ends the survey of the most tedious, difficult and most expensive portion, from a surveying point of view, of the shores of the lakes. Such a broken up coast line can hardly be found the world over. Whilst some portions of the lakes may be more difficult to triangulate on account of the configuration, still the progress will be more rapid, as shoals are neither so numerous, nor so hard to find. On the whole the weather during the past season has been about the average except during May which was cold and wet, the other months being dry and hot with considerable wind, not amounting to strong breezes. The fall has been unusually warm for Georgian Bay and was not marked by the long continued wet stormy weather that usually marks the closing of the season.

Mr. Anderson and I will be fully occupied during the coming winter in finishing the rough of the past season's work, preparing the sheet for the engraver, getting out sailing directions to accompany it and in calculating and plotting the triangulation of Nottawasaga Bay. During the past season charts of "Burrard Inlet," "Parry Sound and its approaches," and sailing directions for the latter were issued and are now on sale.

In closing this report I have to thank all the officers and crew for their assistance during this my first season in charge, and engaged on probably the most difficult portion of the Bay. To Capt. McGregor particularly I am much indebted as he often went a long way from his official duty to aid me and the survey in exploring for anchorages, developing and buoying channels for our own especial use, and in building large beacons when I was otherwise engaged.

I have the honour to be, sir,

Your most obedient servant,

WM. J. STEWART.

In charge S. G. B.

APPENDIX No. 5.

STEAMBOAT INSPECTION.

REPORT OF THE CHAIRMAN OF THE BOARD OF STEAMBOAT INSPECTORS.

OTTAWA, October, 1893.

Sir CHARLES HIBBERT TUPPER,
Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit herewith my annual report for the half year ending 30th June, 1893; heretofore the chairman's annual report has been made for the calendar year.

The report gives the total number of steamboats in the Dominion as known to the inspectors, form No. 1 showing those steamboats which were inspected up to the 30th of June, 1893, and form No. 2 showing the steamboats not inspected up to the 30th of June, 1893. Form No. 4 shows the number of steamboats added to the Dominion, and form No. 5 the number of steamboats lost, broken up or otherwise put out of service.

Tables A, B and C show the total number of steamboats in the Dominion, and their gross tonnage, the amount of dues and fees collected, and the number of steamboats added to the Dominion, with their gross and registered tonnage.

BOARD MEETINGS.

A meeting of the Board of Steamboat Inspection was held at Toronto on the 10th of March. The members present were James Johnston, John Dodds, Thomas Harbottle, and the chairman, at which a resolution was passed recommending the repeal of rules relating to man-holes on boiler shells, sections 38, part 1, and 56, part 2, and substituting the following rule:—

“Man-hole openings must be stiffened with compensating rings or plates of at least the same effective sectional area as the plate cut out, and in no case shall such rings or plates be of less thickness than the plate to which they are attached, nor the attachment of less strength than the plate or ring. All openings in the shells of boilers should have their short axes placed longitudinally, and if not so placed, must have compensating plates or rings, and attachments equal to twice the effective sectional area cut out.”

This resolution was approved by Order in Council, dated Tuesday, the 28th day of March, 1893.

AMENDMENTS TO THE ACT.

Section 43 of the Act 49 Victoria, chapter 78, and subsection 2, section 5, of 52 Victoria, chapter 23, amending section 61, chap. 78, were, repealed and replaced by the Act 56 Victoria, chapter 25.

Section 1 enacting that any person serving as engineer on any passenger steamboat of “whatever tonnage,” or on any freight steamboat of “over 150 tons gross,” must hold a certificate from the Minister, qualifying such person for the steamboat he is serving on, as engineer.

Section 2 provides that if he sees fit the Governor in Council may authorize the payment of a portion of any fine imposed on a steamboat to the informer.

INSPECTOR APPOINTED.

The office of inspector of steamboats in the Manitoba, Keewatin and North-west Territories division becoming vacant by the retirement of Mr. Ed. R. Abell, Mr. Charles E. Robertson was appointed to the office by Order in Council, dated the 6th day of February, 1893, and commenced his duties as steamboat inspector on the 17th of March, 1893, with his residence at Winnipeg, at a salary of \$1,000 per year.

CASUALTIES.

There were no casualties reported involving loss of life. The steamboats lost, and some minor casualties, were as follows:—

West Ontario Division.—The steamboat "Lothair," of Port Hope, was destroyed by fire at Windsor on the 2nd of January, 1893.

The "Macassa," of Hamilton, broke her port shaft on the 20th of April.

The "Northern Belle," of Owen Sound, broke her low pressure cylinder and cylinder cover, and part of her engine frame, caused by the breaking.

The "Macassa," of Hamilton, broke her port shaft on the 20th of April; her screw was also broken by striking the wharf, and when the vessel was docked to put on a new screw, the fracture in the shaft was discovered, it being in that portion of the shaft in the water.

The "Northern Belle," of Owen Sound, broke her low pressure cylinder and cylinder cover, and part of her engine frame, caused by the breaking of the low pressure crank pin strap, while on the voyage from French River to Killarney on the 11th of May. No specific reason can be given for the breakdown. A new butt has been welded on the connecting rod; a new strap has also been fitted to the rod, to which it is secured in an improved manner.

The crank pin of steamer "James Clarke" broke on 9th July. It was larger than required by our rules. She was towed to Wiarton and repaired.

East Ontario Division.—The steamboat "Orion," of Toronto, broke her main valve spindle on the 23rd of June when about three hours out on her voyage from Collin's Bay to the Welland Canal. The spindle broke at the bottom of the thread where connected; the break showed a slight flaw in the material. The engineer made a temporary repair and worked her back into port, for which he deserves credit for the ingenuity displayed.

Montreal Division.—The steam cable tug at Castleford while towing logs broke all the geared wheels on paddle and intermediate shafts on 1st of June, caused by the teeth riding hard in the bottom.

The steamboat "Charlotte," of Mattawa, while carrying passengers on the 13th of June from LaCave to Les Erables, ran on a rock, carrying away her tiller close to the rudder. The passengers were placed on the scow she was towing till temporary repairs were made to the tiller, which was done by taking the lever which operated the exhaust and fitting it to the rudder head. In the meantime she was pulled off by men on shore, the temporary repairs enabling her to proceed and finish her trip, and having a new tiller fitted on her returned to LaCave.

The steamboat "T. Osborne" took fire during the night of the 27th of May. The interior of the vessel was badly burned. It is not known what caused the fire.

Quebec Division.—On the 9th of June the passenger steamboat "Montreal" while lying at her wharf at Three Rivers broke her low pressure steam-chest from over pressure, or possibly from water getting through the condenser; it is not certain as to what was the cause of the breakage, further than that the steam-chest was not strong enough. This weakness may have been caused by cutting away the ribs and boring holes in the same central line, thereby making the casting much weaker than it was when the inspector saw it in the shop as it was cast, and when he inspected it in the boat he could not see any alteration in the casting except the holes, which, taken alone, did not take much of the strength away.

The experts who investigated the occurrence for the owners, report that "the anxiety of your management to get the boat into commission had overruled the

better judgment of your engineering staff, who wished to discard parts of the machinery, which were manifestly defective, but which unwisely, on the plea of urgency, were allowed to be put into the boat."

The Quebec inspector, Mr. Samson, has arranged to have the machinery of the steamboat "Montreal" taken apart and thoroughly examined by him before the next season opens.

On the 19th of June the passenger steamboat "Carolina" on her way up to Montreal ran on the rock at Chaudière on the north side of the river, which put holes through her bottom, and she made water so rapidly that she had to be beached at Cap Rouge, at the long wharf. The accident to the "Carolina" was caused by hugging the shore too closely, it is supposed to gain time.

On the 19th of June the passenger steamboat "Otter" was stranded at Seven Islands. She was pulled off by a tug and steamed to port. The accident was caused by running in a fog.

MARITIME PROVINCES DIVISION.

The passenger steamboat "Havana" got on the rocks at Burgess, Newfoundland, on the 16th of March, and had a hole knocked in her bottom. She was pumped out and towed to Halifax for repairs.

The accident occurred while attempting to moor her, by one of the mooring lines becoming entangled in the screw; the vessel then drifted on the rocks and pounded a hole in her bottom. No blame can be attached to any one, as with the greatest care accidents of this kind will occur.

The steamboat "Carroll" blew a joint out of one of her safety valve seats when leaving Boston for Halifax; she returned to Boston the same day (18th of March), and left that night for Halifax after making a new joint. The failure of the safety valve joint was a trifling affair, as had the vessel been at sea she could have proceeded with one boiler while the joint was being re-made. There does not appear to be blame attaching to any one, as joints may blow out without any previous warning being given.

The ss. "Dominion," passenger and freight, between St. John, Yarmouth and Halifax, stranded at the entrance of Lunenburg harbour on the 24th of April, and became a total wreck. I have no information as to the cause of the stranding.

MANITOBA, KEEWATIN, AND NORTH-WEST DIVISION.

The cross head of the "Millie Howell," a fishing tug on Lake Winnipeg, broke on the 17th of June, when near Horse Island, causing the cylinder end to be broken also. She was running alongside of the fishing tug "Sultana," owned by the same company, and both heading for Horse Island.

BRITISH COLUMBIA DIVISION.

The steamboat "Caribou and Fly" broke her starboard shaft near the screw on the 29th of January, when on her voyage to Skeena River. She steamed to Low's Inlet with the port screw and broke her port shaft. New shafts were sent to her from Victoria.

There are logs drifting in the waters traversed by the "Caribou and Fly" on the route to Skeena River, and it was by striking a log that the starboard shaft was broken, and the port shaft was broken by striking a boulder in Low's Inlet.

The broken shafts were strong enough, according to the rules for calculating the strength of shafts. The new shafts which were fitted to the vessel were made considerably larger than the old shafts. There was not a formal inquiry made by any one. The accident was reported to the inspector by the engineer of the vessel.

The "Vancouver," while at anchor in Miner's Bay was run into at about 2 a.m. on the 15th of May by the "Yosemite," and had her port quarter damaged. She was taken to Victoria and repaired on the marine ways. No inquiry made, nor report received by the inspector.

The "Minnehaha" was wrecked on Trial Island on the 7th of April, and became a total loss.

The inspector received no report of the loss of the "Minnehaha," nor did he make a formal inquiry, there being no loss of life, nor complaint regarding the vessel.

PROCEEDINGS ORDERED, VESSELS TIED UP, AND RESULT IN EACH CASE.

Proceedings were ordered for the prosecution of the steamboats "Camilla," "Dauntless," "J. R. Booth," "Sparrow," "Spitfire" and "Maud," in September, 1892, and the "Camilla" was fined on the 20th of January, 1893, for:

Neglecting to have inspection made and a copy of the certificate of inspection delivered to the collector of Customs..	\$400 00
Carrying passengers not having a passenger certificate.....	50 00
Not having a certificated master.....	100 00
Not having a certificated engineer.....	100 00
Total.....	\$650 00
And costs.....	79 89

Total of fines and costs..... \$729 89

By Orders in Council of dates the 13th February and 21st March, 1893, the moiety of the fine, amounting to \$275, belonging to the Government, and the whole of the fine (\$100) for employing an unlicensed master, were remitted on the "Camilla," provided all legal expenses were paid by the owner, Mr. John Ferguson.

"Dauntless."—This prosecution was ordered in 1892 and concluded December the 21st, 1892; fines amounting to \$650 being imposed, viz. :—

For non-inspection..	\$400
Carrying passengers without a license	50
Not having a licensed master	100
Not having a licensed engineer.....	100

Total fines..... \$650

The fines were remitted by the Government, and the costs amounting to \$134.18, were paid by the owner.

"J. R. Booth."—The proceedings in this case were ordered in 1892, and the fines imposed on the 21st January, 1893, amounting to \$650, with costs amounting to \$83.71. The counts on which the fines were imposed were:

Running the steamboat without her having an inspection certificate.....	\$400
Without a certificated engineer	100
Carrying passengers on three occasions, the fine for each offence, \$50	150

Total fines..... \$650

The fines were remitted, and costs paid by the owner.

"Sparrow."—In this case the fines amounted to \$500 and costs \$148.27. The fines being imposed for:

Running without having a certificate of inspection.....	\$400
Not having a certificated master.....	100

Total fines..... \$500

The fines imposed on the "Sparrow" were remitted by the Government, the owners paying the costs.

"Spitfire."—Case withdrawn, the owner paying \$9.50 for expenses, 4th April, 1893.

"Maud."—Case withdrawn, the owner paying \$9.50 for expenses.

The steamboats "Camilla," "Dauntless," "J. R. Booth," "Sparrow," "Spit-fire," and "Maud" are all on all Lake Nipissing. It appears that the practice had been for the late inspector for the Nipissing district to send steamboat owners in locality notice as to when he would visit it to inspect their vessels. The owners were expecting the notice and coming of the inspector all through the season, and had their vessels ready for inspection, but no inspector visited that district last season, as Mr. Burgess, the inspector of the district had been superannuated and has since died, and another inspector was not appointed until the 6th of September, when he commenced work, and could not get to the Nipissing district until too late in the season to attend to it.

The carrying of passengers on the steamboat "J. R. Booth" was done by the master of the vessel without the knowledge or consent of the owner, and without receiving any remuneration or fee for carrying the passengers, and to oblige one of the Rev. Fathers who has a parish in the neighbourhood, to give his congregation an excursion on the "J. R. Booth," the only vessel running on the lake which was large enough for the purpose.

For these reasons the fines were remitted on the "J. R. Booth," and as the same reasons applied to the other steamboats fined, they were all remitted on payment of the costs.

"Wamla."—This vessel was tied up on the 26th April, 1893, on account of not having a certificate of inspection.

The plates of which the boiler is built not having the stamp or name of the maker on them, as required by law, the inspector could not grant her a certificate of inspection.

"David Weston" was built of wood in 1886, at St. John, N.B. There were repairs done on her in 1889, and she was tied up for further extensive repairs in May, 1892, by Inspector Coker. The repairs and renewals done in 1892 were:—Paddle beams, a frame, spring beams, bridge beams, paddle boxes, stringers complete length of boat, all new, of pitch pine, ends of all curbings to saloon deck made good by scarfing, 20 beams new, 12 hanging knees inside new and well fastened, all new timbers from the after end of boiler to stem of spruce, new keelsons, and four strakes of bilge keelson running right forward, all new planking from keel to gunwale on both sides, deadwood forward new, deck amidships on both sides new, deck on both wings new, 100 feet of rail new, 40 new stanchions, stern post rebolted and champed where it was split, 100 feet of guards new, and the vessel was caulked and generally overhauled.

In addition to the hull, repairs were made to the boilers, seven soft patches being put on the port boilers, and stays over furnaces in each boiler:

The owners being dissatisfied with the action of the inspector, and claiming damages for \$30,000, served a writ on Inspector Coker, on the 20th of June, 1893. The papers in the case are still in the Justice Department, no result being yet arrived at.

PENALTIES COLLECTED.

Alexander Dow, master of the steamboat "Penticton," of New Westminster, B.C., paid a fine of \$100 on the 26th of January, 1893, imposed for acting as master on the "Penticton" without having a master's certificate.

Wm. Beynon, master of the freight steamboat "Caribou and Fly," of Victoria, B.C., paid a fine of \$100 on the 6th of April, 1893, imposed for violation of the Steamboat Inspection Act, by carrying passengers on the "Caribou and Fly," the steamboat having a certificate for freight only.

I have the honour to be, sir,
Your most obedient servant,

W. J. MENEILLEY,
Chairman Board of Steamboat Inspection.

APPENDIX No. 6.

REPORT OF CHAIRMAN OF BOARD OF EXAMINERS OF MASTERS
AND MATES.

HALIFAX, N.S., 28th September, 1893.

SIR,—I have the honour to submit the annual report of the proceedings of the Board of Examiners of Masters and Mates from the 30th June, 1892, to the 30th June, 1893, the end of the fiscal year.

The Board met for examinations as follows:—

Port of Halifax.....	11 times.
do St. John.....	10 do
do Yarmouth.....	8 do
do Quebec.....	2 do

Total..... 31 times.

At Halifax seventeen applications were made for foreign-going certificates as masters, ten for coasting and one for yachting.

Eleven foreign-going masters received certificates and six failed. Eight coasting masters passed and one failed and one was not examined on account of sickness. One certificate was also granted for a master yachting.

Twenty-three applications were made for foreign-going mates certificates and one for coasting.

Fifteen foreign-going mates received certificates and eight failed and one coasting mate received a certificate.

At St. John eleven candidates applied for foreign-going certificates as master, ten passed and one failed.

Twenty also applied for foreign-going certificates as mates, fourteen received certificates and six failed.

At Yarmouth seven applications were made for foreign-going certificates as master.

Three candidates were granted certificates and three failed and one was not examined on account of sickness.

Fifteen candidates applied for foreign-going certificates as mates, eight passed, seven failed.

Three applicants also presented themselves for certificates as mates' coasting, two passed and one failed.

At Quebec three candidates applied for mates' certificates foreign-going and three passed.

Thus it will be seen for the twelve months ending 30th June, 1893, thirty-five applications for masters' certificates of competency, foreign-going, and sixty-one for mates, were made.

Twenty-four masters and forty mates received certificates.

Ten applications for certificates as master coasting and four for mates, were also made to the Board of Examiners.

Eight masters and three mates obtained certificates, one yachting certificate was also granted to a candidate at Halifax.

Sixteen certificates of service were issued for masters and eleven for mates and twenty-two renewal certificates.

The total number of certificates issued by the Department of Marine and Fisheries, including competency, service and renewal, upon application of candidates

to the Board of Examiners, was one hundred and twenty-six and fees to the amount of seven hundred and ninety-seven dollars were collected.

This does not include coasting and inland certificates granted by the department after an examination at other ports than those above mentioned.

Amongst these applicants, some have presented themselves, either for master or mate, a second or third time, having failed at previous examinations.

The names of these candidates appear upon the books as often as they come forward. They are, however permitted to have a second trial without paying another fee, but on each successive occasion after that, they are required to pay the full amount of the fee.

I desire to draw your attention to the fact that a number of candidates for service certificates, are still presenting their applications to the various collectors of customs at the out-ports, which are forwarded to me, but I seldom see any of this class of candidates.

It will be observed that most of them produce one testimonial, stating they held the position of master or mate, as the case may be, previous to the year 1883. Sometimes this certificate dates back several years, but it entitles them to receive a service certificate for the grade they ask for.

From the answers to questions casually put to the candidates who have made application personally to me at Halifax, it can be seen that the majority of these are capable seamen, but it is apparent that many of them know little of the regulations for preventing collisions at sea.

We so often notice in our Vice-Admiralty Courts, in cases of collision, dangerous errors shown to have been committed from ignorance of these rules, and in one recent case, the master of a schooner was blowing a horn while his vessel was at anchor in a fog, instead of ringing a bell, according to Article 12 (C) of the regulations.

It is a fact that very many small vessels do not carry a bell.

There is also an impression amongst seamen that when two steamers are approaching one another, in opposite directions, during a fog, in narrow waters, the masters may indicate to each other, if considered necessary, their intention to direct the course of their ships to port or starboard, by blowing certain blasts upon the fog whistle, although they may not have each other *in sight* at the time.

Article 19 of the Regulations distinctly states "A steamship under way may indicate that course to any other ship which *she has in sight* by the following signal, viz. :—

One short blast to mean "I am directing my course to starboard."

Two short blasts to mean "I am directing my course to port."

Three short blasts to mean "I am going full speed astern."

It can therefore be seen that in fog, in mist or falling snow, no other sound is legal than one prolonged blast upon the fog horn at intervals of two minutes, unless the other vessel is *in sight*.

I am, sir, your obedient servant,

W. W. SMITH,
Chairman.

RESULTS of the different Examinations.

PORT.	MONTH IN WHICH HELD.	APPLICATIONS.		PASSED.		FAILED.		FEES.
		Masters.	Mates.	Masters.	Mates.	Masters.	Mates.	
Halifax	July	1 coasting.				1 coastg.		\$ cts. 8 00
St. John	do	1	2		2	1		20 00
Halifax	August	2	2	1	2	1		15 00
do	September	2 f.g. 1 coastg 1 yachting	4	2 f.g. 1 coastg 1 yachting	4			58 00
St. John	do	2		2				20 00
do	October	1	1	1	1			15 00
Yarmouth	do	1	1	1	1			15 00
Halifax	November		3		3			15 00
Yarmouth	Nov. & Dec.	1	2 f.g. 1 coastg		2 f.g. 1 coastg	1		28 00
St. John	December	1	5	1 f.g. 1 coastg	4		1	35 00
Halifax	do	1 f.g. 1 coastg	2	1	1		1	20 00
do	January	1 coasting.		1 coasting.				8 00
St. John	do	1	1	1			1	10 00
Yarmouth	do	1	2		1	1 sick.	1	10 00
Halifax	February	2	2 f.g. 1 coastg	2	1 coasting.		2 f.g.	29 00
St. John	do	1	1	1	1			15 00
Yarmouth	do	1	1 f.g. 1 coastg	1	1 f.g.		1 coastg.	4 00
Halifax	March	1 f.g. 1 coastg	3 f.g.	3 coasting.	1	1 f.g.	2 f.g.	52 00
St. John	do	2	3	2	1		2	35 00
Quebec	do		2		2			10 00
Yarmouth	do	1	3			1	3	25 00
Halifax	April	2 f.g. 2 coastg	3	2 f.g. 1 coastg			3	13 00
St. John	do		4		4			10 00
Quebec	do		1		1			5 00
Yarmouth	April & May	1	2		1	1	1	10 00
Halifax	May	2 f.g. 1 coastg	2	2 f.g. 1 coastg	2	1 f.g.		33 00
St. John	do	1	1	1	1			15 00
Yarmouth	do	1	2	1	2			10 00
Halifax	June	5	2	2	2	3		50 00
St. John	do	1	2	1			2	20 00
Yarmouth	do		2				2	5 00
								618 00

CERTIFICATES OF SERVICE.

RENEWAL CERTIFICATES.

FOREIGN-GOING.			COASTING.			COMPETENCY.			SERVICE.		
Masters	Mates	Fees.	Masters	Mates.	Fees.	Masters	Mates.	Fees.	Masters	Mates.	Fees.
		\$ cts. 5 00			\$ cts. 60 00 22 00	3 coastg 13 f. g.		\$ cts. 12 00 65 00 2 50	3 coastg. 2 f. g.		\$ cts. 6 00 5 00 1 50
1		5 00	15	11	82 00	16	1	79 50	5	1	12 50

APPENDIX No. 7.

REPORT ON SIGNAL SERVICE.

QUEBEC, 2nd October, 1893.

SIR,—I have the honour to inclose herewith annual report and Appendices A, B and C for the fiscal year ending 30th June, 1893.

Your most obedient servant,

H. J. McHUGH.

QUEBEC, 30th September, 1893.

To the Deputy Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit the following report as to the service for the year ending 30th June, 1893.

As in preceding seasons, reports have been received from the stations in the lower part of the river and gulf, recording the weather, wind, condition, location and movement of the ice during the winter and spring months and during the season of navigation all inward and outward vessels as signalled or seen from the stations.

The winter of 1891-92 was remarkable for the light fall of snow and the lateness of the season when ice first formed. The past winter of 1892-93 has been equally as remarkable. Navigation was feasible all winter, even to ports that as a rule are inaccessible in winter. Sydney Harbour was open throughout the whole winter. The s.s. "Havana," of Halifax, trading from that port to Newfoundland was able to call in to North Sydney weekly during the whole winter.

The ice met by incoming steamers was outside the gulf with the exception of some field ice between Cape Bay and the Bird Rocks. For a few days owing to heavy west and north-west winds the north and west coast of Cape Breton and the vicinity of the south side of St. Paul's Island was packed with ice and disappeared shortly after.

The Gut of Canso was closed to navigation on 8th January, 1893, and clear of ice on the 22nd April.

Port Mulgrave, Gut of Canso was named a reporting station on the 3rd of November, 1892, with the purpose of reporting a clear passage to vessels. These reports were sent to Halifax, N.S., Pictou, N.B., and Charlottetown, P.E.I.

Grosse Isle Quarantine Station was also named a reporting station on the 18th May, 1893. All transatlantic vessels are reported as soon as pratique is given them, this has proved of great advantage to the shipping interests.

From the 1st to the 20th April three reports per week were obtained and forwarded to the Boards of Trade, Montreal, St. John, N.B. and Quebec and to the Chamber of Commerce, Halifax, N.S.; also to the press of Montreal and Quebec, to the agent of the Department, Quebec, to the Custom-house and Immigration agent, to agents of steamship lines, tug owners, to the pilots for below and above Quebec, also to Messrs. H. Fry & Co., Lloyds Agents, Quebec.

From the 20th of April, two reports were received and forwarded as above, and in addition the News Room, North Sydney, is also supplied with the reports during the season of navigation. The Quarantine doctor at Rimouski is also supplied with a report of the incoming mail steamers.

Information as to the wind, weather and ice in the vicinity of Anticosti, Magdalen Islands, Meat Cove, C.B., St. Paul's Island, Cape Ray, Nfld., is also sent to Point Esquimaux for the guidance of the sealing fleet.

This is the third season that no ice has been seen in the vicinity of St. Pierre-Miquelon.

Full information was supplied from the Bureau here to the agents at Anticosti, Magdalen Islands, Meat Cove, C.B., St. Paul's Island, Cape Ray, Nfld., Low Point, North Sydney, from the 18th April and to Cape Race from the 13th April, as to the weather, wind, movement and condition of the ice in the River and Gulf of St. Lawrence up to Montreal for the guidance of any vessel calling for information.

BIRD ROCKS.

The Bird Rocks being no longer a Signal Station, it is very important however to have a record of the movement and foundation of ice in its neighbourhood, also on account of its being one of the best seal hunting centres in the Gulf, the following may prove interesting:—

January 11th to 14th.—Light slob ice formed outside and then disappeared until the 29th, when it remained until the end of the month, north-west wind.

February 1st to April 17th—Light open to closed packed ice was visible from the Island, but none after that date.

February 24th—A fox made its appearance near the lighthouse, having made its way over on the ice.

February 25th—A fox, presumably the same, was seen on the little Bird Rock.

March 4th to 14th and from the 17th to the 30th—Large shoals of seals, old and young were in full sight of here.

March 15th.—3 sealing steamers in sight.

March 16th.—1 sealing steamer in sight.

April 1st. and 2nd.—The Magdalen Islands, fleet of steamers near in sight off here.

April 3rd. and 4th.—Two shoals of seals off of here.

CAPE RAY, NEWFOUNDLAND.

February 9th., 1893.—First sign of ice which formed and remained in open form to the rest of the month west winds, clear, weather.

March.—Heavy open to close packed ice around the Cape all this month, north north-west winds. Snow fell on a few days only.

March 11th.—2 steamers and three schooners left for seals.

do 11th.—12 schooners sailed.

March 20th.—12 schooners sailed; one reported crushed in ice.

March 22nd.—8 schooners in ice.

do 24th.—11 do

do 25th.—5 do

do 26th.—8 schooners, 1 steamer in ice.

do 27th.—5 schooners in ice.

do 28th.—11 do

do 29th.—9 do

April 3rd.—7 do

do 4th.—9 do

do 5th.—7 do

do 6th.—6 do

do 7th.—16 do

do 8th.—7 do

April 1st.—Heavy close packed ice distant.

do 2nd.—No ice in sight.

do 3rd. to 8th.—Heavy close-packed ice distant, north north-west winds, clear weather. No ice seen after latter date.

WINTER NAVIGATION IN THE ST. LAWRENCE.

The steam wrecking schooner "Anna Magee," Captain Caouette, left for the Gulf to cruise along the north shore, and "Anticosti" left on 14th February, and returned to port on the 20th March, having had no trouble to get through the ice.

A bateau was taken on 1st March from Quebec Etchemin, there loaded with deals, and within a few days delivered them on the commissioners' wharf. The river here being free of ice.

March 3rd.—The ss. "Newfoundland" being fitted out as a sealing vessel, left Halifax on this date for the inner gulf. Her catch was 12,000 seals.

March 17th.—The steam schooner "Diver," Captain Bejin, left for Grosse Isle.

April 11th and 12th.—Several schooners arrived up from below.

April 14th.—The tug "Dauntless" came out of winter quarters yesterday and moored at Crawford's wharf.

April 19th.—Ss. "Alert" out of winter quarters. The White Island Reef Light-ship came out of winter quarters.

1892—Last Outward Bound Steamer.

November 27th.—Ss. "Thames," Captain Couillard, passed out this day for sea.

1892—Last Outward Sailing Vessel.

November 24th.—The ship "Geo. L. Hay" was towed out this day bound for Buenos Ayres.

First Inland Bound Transatlantic Vessel.

The ss. "Charrington" from Messina, 26th March, passed Cape Ray at 6 p.m., Saturday, 15th April, passed Fame Point, 9.30 a.m., on the 18th, and arrived in port at noon on the 20th, met ice sixty miles south-east of Cape Ray and from latter place to thirty miles to the westward met none, then entered an extensive field of some fifty miles in extent.

The ss. "Fremona" from the Mediterranean passed Fame Point, at 3.30 p.m. of the 25th April, and arrived in port at 4 p.m., on the 27th instant. The captain reports met the first ice sixty miles south of Scatterie, forty miles north of Cape Ray, again met ice which continued up to the Bird Rocks.

SS. "Rydal-Holmes" from Barrow for Montreal, passed St. Paul's, 25th April, and arrived in port, 10 a.m., May 1st.

First Transatlantic Sailing Vessel to arrive.

The barque "H. G. Cann" from Liverpool, 4th April, arrived in port 5th May.

First Outward Transatlantic Steamer.

The Royal mail steamship "Labrador," Captain McAuley, cleared on 13th May, for Liverpool. This is seven days later than the ss. "Warwick" left last year.

Respectfully submitted,

H. J. McHUGH,
Inspector Signal Service.

APPENDIX A.

Report on ice, &c., in the Straits of Belle Isle, as noted by the agents of the Department at Belle Isle, Cape Bauld, Cape Norman, Forteau and Greenly Island from October, 1892, to June, 1893.

BELLE ISLE.

December 23rd, 1892.—First appearance of sheet ice, making for the Labrador shore. In 1891 the first ice was noticed on the 21st November.

The last vessel outward bound, a bark, passed on the 22nd November.

No icebergs were seen from here during November or December. As compared to the same month in other years, December was free from fog or icebergs, making the passing through the straits perfectly feasible. 29th December thin ice scattered to east and south. 30th December a good deal of thin ice scattered through the straits moving to the east.

North-north-west to south-west winds prevailed during the month.

Snow fell on the 15th and 25th of December only.

1st to 16th January mild, with snow; on the 6th and 12th rain and fog; on the 7th ice set in from the north-east.

17th January, temperature fell to 30° below zero and from this date to end of the month variable weather with a good deal of scattered ice.

Variable winds from north-west to east north-east, the ice drifting with the winds.

February.—This month proved very cold; the thermometer on the 17th instant showing 22° below zero. Ice made very fast; hummock ice appearing at times and extensive field ice on the 24th instant.

February 1st, 2nd and 20th.—Snow fell freely.

February 23rd.—Rain and sleet with a hurricane from the south-south-east.

February 28th.—Clear water along the Labrador shores, a light press of ice to the east, moving south, this appear to be Arctic ice there being a few icebergs among it.

The first part of the month west to north and north-west winds prevailed and during the latter part south-south-east-north.

March.

This month was of the average temperature, the thermometer having gone below zero in two days only the 22nd and 23rd, owing to various winds, ranging from north to east, south-south-west, south-west to south-east, the ice kept moving in and out of the Straits at a rate of from one knot to three knots.

March 11th and 12th.—SS. "Panther" lying to off Cape Bauld.

March 13th.—SS. "Panther" hauled off to the south-east.

March 19th and 25th.—Three schooners between here and Cape Bauld.

March 31st.—Sch. "Rose Clear," of Trinity Bay, Nfld., which left port on 4th March, called to get information about seals; strong to heavy winds and cold weather, had poor success, having caught but 70 seals.

March 25th.—A large number of seals noticed on the ice.

April.—Mild weather setting in although the thermometer went to 3° below on the 6th and 5° below on the 7th instant. A good deal of ice formed and covered the straits.

April 22nd.—The edge of the western ice visible above Cape Norman.

The winds continued to be variable, with snow on the 10th and 11th; fog and rain on the 28th instant.

Icebergs.

April 19th.—Sixteen large icebergs to the eastward, 30 miles off.

May.—A good deal of snow and rain fell this month. Temperature rising, and the prevailing winds being from the north-north-east to east-south-east. The straits were pretty well covered all this month with ice. Field and sheet ice disappearing on the 29th instant.

May 10th.—One schooner off White Lake.

May 25th.—One schooner off Cape Bauld.

May 27th.—Schooner "Beulah," from St. John's, Nfld., called and landed fishing crew.

May 5th.—One hundred and eight to the east.

May 8th.—Sixty-eight to the east.

May 9th.—Eighty-four to the east.

May 10th.—One hundred and forty scattered.

May 29th.—Sixty-five to the east.

CAPE BAULD.

As stated in previous reports, the distance from Belle Isle being but 14 miles, the observations as to weather, wind, &c., vary but little.

The catch of seals at this place was, however, favourable, some being killed in December, 1892, January and February and March, 1893.

March 22nd.—Forty killed.

March 23rd.—Fifteen killed.

March 31st.—Eight hundred killed.

April 1st.—Two hundred killed.

June 1st.—Steamship "Panther" called.

June 27th.—One hundred schooners passed, going north to the Labrador fishing grounds.

June 29th.—One man-of-war passed at 1.30 p.m.

CAPE NORMAN.

November 13th.—First fall of snow, Labrador shore and hills covered. Snow again fell on the 17th and 30th.

The weather remained mild with prevailing winds from north-north-west to south.

Icebergs.

October 3rd, 1892.—One seen.

October 7th, 8th and 9th.—Two seen.

October 14th and 15th.—Five seen.

November, 1892.—Cold blustery weather, with wind from north-north-east all the month; snow fell during 11 days of this month. No icebergs were seen.

December, 1892.—As in the proceeding month, north-north-east bearing to south-east winds prevailed. Snow fell on 14 days of this month.

No icebergs seen, but on 19th December, a flock of over 50 seals were seen going east.

December 15th to 31st.—The straits were covered with ice, open to close packed, moving west.

January, 1893.—This proved a rough, cold and disagreeable month, winds ranging from south-west to east, north-east, and with the exception of eight days, snow fell every day.

The straits were covered with close-packed ice inshore and distant, extending westwards, all this month.

Icebergs.

January 23rd, 1893.—One seen.

January 24th.—Two seen.

February.—With the exception of the 21st, 22nd and 23rd, when the straits were clear of ice, heavy close-packed ice kept along the shore north-north-west to north-east winds prevailing, and driving it to the eastwards. Snow fell during 14 days of this month.

Icebergs.

February 4th to 14th.—One in sight every day.

March.—Similar to February, with snow on nine days only, and rain on the 15th instant.

Icebergs.

March 5th to 13th and 22nd to 31st.—One seen each day.

March 20th.—Twenty-two seals killed.

March 30th.—A flock of seals amounting to thousands on the ice off here this day 300 were killed and landed.

March 31st.—Four seals killed.

April.—The straits open on the 29th only. The rest of the month as in the two proceeding ones snow fell on fourteen days south-east to south-west winds during the ice to the eastward.

Icebergs.

April 17th to 21st.—One in sight every day.

May 18th and 19th.—Straits free of ice all other days covered with open to close packed ice in shore and distant. In the early part of the month snow fell and rain towards the latter part, south-east winds.

Icebergs.

May 8, 1893.—21 seen

May 9. —31 do

May 10. —37 do

May 11. —17 do

May 12. —19 do

May 13. —17 do

May 14. —16 do

May 15 to 27— 8 do daily.

May 28. —20 do

May 30. —13 do

May 31. — 8 do

June.—Straits clearing rapidly of field ice, heading up and lakes visible all over. Snow fell on the 2nd instant and none after.

Icebergs.

June 1st to 23rd.—8 seen daily.

June 24th to 31st.—52 seen daily.

FORTEAU.

November 11th, 1892.—First snow.

December 12th, 1892.—First slob ice making. The latter part of this month proved cold, slob and sheet ice formed fast along shore.

May 19th.—Last field ice seen. The general remarks as to weather, winds, ice, etc. at this station are partly similar to Cape Norman being almost opposite and this being the narrowest part of the straits.

GREENLY ISLAND.

October 18th, 1892.—First snow fall.

November and December.—Very little snow fell, weather, mild and clear. North to south-east winds, no ice.

January 8th, 1893.—First appearance of ice which increased rapidly and extended some ten miles out from shore remaining stationary all month. Weather moderate, west-south-west winds, snow fell on ten days in this month.

February, March, April and up to 8th May.—The ice remained as in January extending from six to ten miles from shore.

May 9th to June 18th.—North to north-east winds, no ice visible.

June 19th to 30th.—Heavy open ice all along shore, south to west winds.

Icebergs.

June 19th to 30th.—Three in sight daily, weather very foggy all this month, south and south-east wind most of the time, two steamers were seen off here going east.

Respectfully submitted,

H. J. McHUGH,

Inspector Signal Service.

APPENDIX B.

THERMOMETER Readings at Belle Isle from January to June, 1893.

Date.	Degrees	Date.	Degrees	Date.	Degrees	Date.	Degrees
Jan. 1.....	10	Feb. 8.....	- 3	Mar. 18.....	16	April 25.....	29
do 2.....	20	do 9.....	- 5	do 19.....	12	do 26.....	36
do 3.....	34	do 10.....	19	do 20.....	16	do 27.....	29
do 4.....	30	do 11.....	23	do 21.....	27	do 28.....	34
do 5.....	14	do 12.....	- 5	do 22.....	- 6	do 29.....	27
do 6.....	30	do 13.....	15	do 23.....	-15	do 30.....	33
do 7.....	37	do 14.....	- 3	do 24.....	10	May 1.....	35
do 8.....	28	do 15.....	26	do 25.....	27	do 2.....	34
do 9.....	20	do 16.....	-10	do 26.....	14	do 3.....	38
do 10.....	19	do 17.....	-22	do 27.....	18	do 4.....	37
do 11.....	32	do 18.....	-18	do 28.....	14	do 5.....	38
do 12.....	29	do 19.....	- 5	do 29.....	14	do 6.....	34
do 13.....	25	do 20.....	24	do 30.....	26	do 7.....	33
do 14.....	24	do 21.....	31	do 31.....	20	do 8.....	34
do 15.....	13	do 22.....	21	April 1.....	24	do 9.....	32
do 16.....	26	do 23.....	34	do 2.....	26	do 10.....	32
do 17.....	- 3	do 24.....	28	do 3.....	29	do 11.....	37
do 18.....	-12	do 25.....	18	do 4.....	30	do 12.....	37
do 19.....	22	do 26.....	10	do 5.....	24	do 13.....	37
do 20.....	29	do 27.....	26	do 6.....	- 3	do 14.....	37
do 21.....	22	do 28.....	26	do 7.....	- 5	do 15.....	37
do 22.....	5	Mar. 1.....	20	do 8.....	24	do 16.....	37
do 23.....	7	do 2.....	19	do 9.....	26	do 17.....	37
do 24.....	14	do 3.....	29	do 10.....	29	do 18.....	37
do 25.....	10	do 4.....	20	do 11.....	30	do 19.....	37
do 26.....	12	do 5.....	16	do 12.....	29	do 20.....	37
do 27.....	25	do 6.....	19	do 13.....	30	do 21.....	39
do 28.....	28	do 7.....	16	do 14.....	27	do 22.....	34
do 29.....	18	do 8.....	24	do 15.....	28	do 23.....	38
do 30.....	29	do 9.....	20	do 16.....	30	do 24.....	39
do 31.....	20	do 10.....	12	do 17.....	30	do 25.....	40
Feb. 1.....	12	do 11.....	18	do 18.....	24	do 26.....	40
do 2.....	12	do 12.....	19	do 19.....	24	do 27.....	37
do 3.....	12	do 13.....	34	do 20.....	27	do 28.....	44
do 4.....	12	do 14.....	22	do 21.....	27	do 29.....	34
do 5.....	- 3	do 15.....	31	do 22.....	33	do 30.....	41
do 6.....	- 5	do 16.....	32	do 23.....	29	do 31.....	41
do 7.....	27	do 17.....	18	do 24.....	31		

Lowest temperature, 18th January; highest, 7th January. Lowest temperature, 17th February; highest, 23rd February. Lowest temperature, 23rd March; highest, 13th March. Lowest temperature, 7th April; highest, 29th April. Lowest temperature, 9th and 10th May; highest, 28th May.

This sign (-) before figures denotes below zero.

(Signed) MICHAEL COLTON,
Light-keeper.

Respectfully submitted,

H. J. McHUGH,
Inspector, Signal Service.

APPENDIX

TELEGRAPH, SEMAPHORE AND SIGNAL

RIVER AND GULF
SOUTH SHORE OF THE

Signal Stations.	Telegraph Offices.	Lighthouse.	Flag Stations.	Semaphore Station.	Miles from Quebec.	Telegraph Co. Working Lines.
1 L'Islet	Tel. Office		Flag		41	Great North-western Co.
2 Rivière du Loup	do	Lighthouse	do		96	do
3 Father Point	do	do	do		137	do
4 Little Métis	do	do	do		197	do
5 Matane	do	do	do			do
6 Cape Chatte	do	do	do		230	do
7 Martin River	do	do	do		255	do
8 Cape Magdalen	do	do	do		288	do
9 Fame Point	do	do	do		318	do
10 Cape Rosier	do	do	do		339	do

NORTH SHORE OF THE

11 Port Neuf	Tel. Office	Lighthouse	Flag		145	Dom. Govt. and G.N.W. Co.
12 Manicouagan	do		do		187	do do
13 Pointe de Monte	do	Lighthouse	do		224	do do

GASPE COAST

14 Cape Despair	Tel. Office	Lighthouse	Flag		372	Great North-western Co.
15 Pointe Maquereau	do	do	do		394	do

COAST OF NEW

16 Point Escuminac	Tel. Office	Lighthouse	Flag		450	Dom. Govt. and G.N.W. Co.
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ISLAND OF

17 West Point	Tel. Office	Lighthouse	Flag		328	Dom. Govt. and G.N.W. Co.
18 South-West Point	do	do	do		358	do do
19 South Point	do	do	do		408	do do
20 Heath Point	do	do	do		428	do do

MAGDALEN

21 Grosse Isle	Tel. Office	Lighthouse	Flag		467	D. Govt., W.U. & G.N.W. Co.
22 Amherst Island	do	do	do		471	do do

CAPE BRETON

23 Meat Cove	Tel. Office	Lighthouse	Flag		529	D. Govt., W.U. & G.N.W. Co.
24 Low Point	do	do	do	Semaphore	575	do do

ST. PAUL

25 Main Station	Telephone	Lighthouse	Flag		528	D. Govt., W.U. & G.N.W. Co.
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NEWFOUN

26 Cape Ray	Tel. Office	Lighthouse	Flag		542	D. Govt., Anglo-Amor. Cabl. Co., W.U. & G.N.W. Co.
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C.

STATIONS, MARINE DEPARTMENT, CANADA.

OF ST. LAWRENCE.

RIVER ST. LAWRENCE.

Rate per ten words and additional words.	Date when established.	Name of Agent.	Post Office.	County.	Province.	Salary per annum from Marine Dept.
25c. & 1c.	Oct. 28, '79.	Mrs. J. B. E. Fortin	L'Islet	L'Islet	Que.	\$50
do	Nov. 16, '81.	L. T. Piuze	Rivière du Loup (en bas)	Temiscouata	do	50
do	Nov. 22, '79.	John McWilliams	Father Point	Rimouski	do	50
do	Nov. 17, '79.	Jules Martin	Little Métis	do	do	50
do	Nov. 5, '79.	P. Desjardins	Malane	do	do	50
do	Sept. 19, '79.	Treffé Côté	Cape Chatte	Gaspé	do	50
do	Sept. 23, '79.	Jean Gauthier	Martin River	do	do	50
do	Oct. 9, '79.	J. F. Sasseville	Cape Magdalen	do	do	50
do	Oct. 14, '80.	James Ascah	Fox River	do	do	50
do	Oct. 20, '79.	E. Costin	Cape Rosier	do	do	50

RIVER ST. LAWRENCE.

40c. & 2c.	June 1, '83.	Dorelas Tremblay	Port Neuf (en bas)	Saguenay	Que.	\$50
do	Aug. 15, '83.	E. Lawson	Manicouagan	do	do	
do	Oct. 19, '83.	V. Faffard	Pointe de Monts	do	do	50

OF THE GULF.

25c. & 1c.	June 17, '80.	James Beck	Cape Despair	Gaspé	Que.	\$50
do	May 22, '80.	Auguste Bertrand	Port Daniel	do	do	50

BRUNSWICK.

40c. & 2c.	July 2, '85.	K. McLennan	Point Escuminac	Northumberland	N.B.	
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ANTICOSTI.

75c. & 6c.	Oct. 1, '81.	Auguste Malouin	Anticosti Id. <i>via</i> Gaspé	Gaspé	Que.	
do	Oct. 18, '80.	E. Pope	do	do	do	
do	July 27, '81.	Jean Nadeau	do	do	do	
do	July 20, '81.	Z. Gagné	do	do	do	

ISLANDS.

\$1.00 & 8c.	Aug. 17, '80.	A. Le Bourdais	Magdalen Id. <i>via</i> Pictou	Gaspé	Que.	
do	June 11, '81.	William Cornier	do N.S.	do	do	

NOVA SCOTIA.

55c. & 3c.	Nov. 7, '81.	A. R. MacDonald	Meat Cove, C.B.	Victoria	N.S.	
30c. & 2c.	Aug. 1, '81.	J. G. Peters	Low Point, C.B.	Inverness	do	\$50

ISLAND.

80c. & 5c.	1890	S. C. Campbell	North Sydney, C.B.	Victoria	N.S.	
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NDLAND.

\$1.05 & 10c.	Nov. 3, '82.	E. R. Rennie	Cape Ray	Newfoundland	Nfld.	\$50
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H. J. McHUGH, *Inspector, Signal Service.*

APPENDIX No. 8.

LIVE STOCK SHIPMENTS.

Record of Live Stock shipped from Port of Montreal during 1893.

Number.	Date.	Steamers.	Destination.	SHEEP.		CATTLE.			Fees Collected.	HORSES.		SWINE.		Hay for Feed.	Grain for Feed.	Number of Men.
				Shipped.	Lost.	Fat.	Stockers.	Total.		Lost.	Shipped.	Lost.	Shipped.				Lost.
1893.																
1	May 7.	Lake Huron.	Liverpool.			462		462		9 24				101,700	28,660	17
2	do 10.	Pickhuben	London.			398		398	2	7 96				88,960	40,260	15
3	do 10.	Lake Winnipeg	Liverpool.			518		518		10 36				125,820	42,320	18
4	do 10.	Brazilian.	London.			402		402		8 04				102,830	38,290	14
5	do 10.	Mongolian	Liverpool.	101		534		534	1	10 68				114,530	42,960	22
6	do 10.	Tritonia	Glasgow.			712		712		14 24	28			141,452	63,060	30
7	do 11.	Toronto.	Liverpool.			396		396	2	7 92				90,110	35,680	15
8	do 12.	Texas.	Bristol.			349		349		6 86				81,110	31,000	13
9	do 12.	Sarnatian.	Glasgow.			608		608	1	12 16	111	1		136,860	68,000	31
10	do 12.	Storm King	London.			451		451	1	9 02				106,060	39,150	18
11	do 14.	Amaranthia	Glasgow			604		604		12 08	10			106,760	44,150	25
12	do 15.	Fremosa.	London.			451		451	1	9 02				115,690	45,000	19
13	do 16.	Laurentian	Liverpool.			581		581		11 62	32			124,890	57,795	22
14	do 17.	Lake Superior	do			568		568		11 36	7			124,740	48,590	23
15	do 17.	Stubbenhuk	London.			390		390		7 80				91,660	34,550	15
16	do 17.	Hibernia	Glasgow.			375		375		7 60	23			84,640	31,935	17
17	do 18.	Draconia	Bristol			150		150		3 00				39,800	10,090	6
18	do 18.	Rosaron.	London.			474		474		9 48				115,640	40,205	19
19	do 18.	Alcidas	Glasgow.			536		536		10 72	20			101,740	44,945	21
20	do 19.	State of Georgia.	Deptford.			337		337		6 74				90,630	45,700	13
21	do 19.	Barrowmore	Liverpool.			698		698		13 96				173,020	72,150	28
22	do 19.	European	Newcastle			387		387		7 74				99,410	34,180	15
23	do 22.	Sicilia.	Bristol			324		324		6 48				73,800	32,175	13
24	do 23.	Sarnia.	Liverpool.			357		357		7 14				75,470	29,620	14
25	do 24.	Lake Nepigon.	do			334		334		6 68				73,710	29,079	12
26	do 26.	Buenos Ayres	Glasgow.			679		679	1	13 68				153,675	60,390	29
27	do 26.	Hestia	do			621		621		12 42				129,765	51,764	25
28	do 26.	Montevideo	London.			454		454		9 06				115,620	45,650	19
29	do 30.	Dominion	Bristol			411		411		8 22				89,200	39,620	16

30	do	30	Augeron.....	Liverpool.....	178	.....	3 56	.....	60,515	30,126	9
31	do	31	Lake Ontario.....	do	550	.....	11 00	.....	117,210	53,400	28
32	do	31	Baumwell.....	London.....	386	.....	7 42	.....	98,370	34,340	15
33	do	31	Pomeranian.....	Glasgow.....	651	.....	13 02	.....	147,100	58,464	25
Total, May.....				101	15,386	.....	306 72	.....	3,490,835	1,387,119	617
Corresponding period in 1892.....				381	16,711	424	334 22	511	.....	.....	670

Value of hay, \$12 per 2,000 lbs. Value of grain, \$25 per 2,000 lbs.

34	June	1	Eacalona.....	London.....	330	.....	6 60	.....	81,750	33,750	13
35	do	1	Avlona.....	Newcastle.....	330	.....	6 60	.....	101,580	28,180	13
36	do	2	Indrani.....	Liverpool.....	650	.....	13 00	.....	133,150	58,500	23
37	do	3	Numidian.....	do	580	.....	11 60	5	132,000	51,000	23
38	do	3	Iona.....	London.....	560	1	11 22	.....	144,920	56,310	22
39	do	6	Caopus.....	Liverpool.....	522	10	10 44	.....	136,720	64,980	22
40	do	6	Oregon.....	do	450	.....	9 00	.....	102,224	34,510	17
41	do	6	Slavonia.....	London.....	121	.....	2 42	.....	32,670	11,616	5
42	do	7	Manitoban.....	Liverpool.....	317	.....	6 34	46	109,959	27,650	17
43	do	8	Warwick.....	Glasgow.....	450	.....	9 00	.....	107,600	26,570	16
44	do	8	Lake Huron.....	Liverpool.....	690	.....	13 80	.....	147,630	62,390	29
45	do	8	Wentmore.....	do	500	.....	10 00	.....	125,220	50,070	20
46	do	9	Austrian.....	London.....	372	.....	7 44	.....	93,000	37,200	14
47	do	11	Toronto.....	Liverpool.....	514	.....	10 28	.....	109,200	47,530	21
48	do	14	Carthagenian.....	Glasgow.....	400	2	8 00	39	98,000	42,000	18
49	do	14	British Crown.....	London.....	589	2	11 78	.....	183,520	57,560	22
50	do	14	Lake Winnipeg.....	Liverpool.....	592	.....	11 84	.....	131,845	48,610	25
51	do	15	Concordia.....	do	510	.....	10 20	.....	139,000	46,150	20
52	do	16	Texas.....	Bristol.....	385	.....	11 55	.....	95,630	36,060	14
53	do	16	Tritonia.....	Glasgow.....	552	.....	16 56	47	141,955	49,790	25
54	do	17	Mongolian.....	Liverpool.....	624	.....	18 72	.....	136,670	64,380	23
55	do	17	Brazilian.....	London.....	493	.....	14 79	16	123,630	50,740	19
56	do	17	Gerona.....	do	501	.....	15 03	.....	123,620	50,300	20
57	do	17	California.....	do	252	.....	7 56	.....	69,738	22,500	10
58	do	21	Sarmatian.....	Glasgow.....	627	.....	18 81	8	155,480	56,480	26
59	do	21	Lake Superior.....	Liverpool.....	582	.....	17 46	.....	134,990	57,230	23
60	do	21	Glengoil.....	Bristol.....	189	.....	5 67	.....	56,710	18,900	7
61	do	22	Amaynthia.....	Glasgow.....	625	.....	18 75	.....	140,000	52,070	24
62	do	25	Rosarian.....	London.....	483	.....	14 49	.....	114,563	43,470	19
63	do	25	Sarnia.....	Liverpool.....	297	.....	8 91	.....	70,200	27,590	12
64	do	25	Memnon.....	London.....	298	.....	9 12	.....	87,590	32,750	12
65	do	25	Norse King.....	do	222	.....	6 66	.....	60,730	22,360	9
66	do	27	Pickhuben.....	do	400	.....	12 00	.....	101,000	40,000	15
67	do	27	Oxenholme.....	Liverpool.....	168	.....	5 04	.....	39,000	16,800	6
68	do	27	Barrowmore.....	do	697	.....	20 91	.....	183,060	66,260	27
69	do	28	Buenos Ayrean.....	Glasgow.....	169	.....	5 07	70	38,025	15,210	11

Record of Live Stock Shipped from Port of Montreal during 1893—Continued.

Number.	Date.	Steamer.	Destination.	SHEEP.		CATTLE.				HORSES.		Hay for Feed.	Grain for Feed.	Number of Men.	
				Shipped.	Lost.	Fat.	Stockers.	Total.	Lost.	Shipped.	Lost.				
1893.															
70	June 28	Lake Nepigon	Liverpool	99		331		331				77,750	32,790	13	
71	do 28	Storm King	London			451		451				124,680	44,890	17	
72	do 29	Virginian	Liverpool			724		724				183,870	56,620	32	
73	do 30	Alexandria	Glasgow			506		506			45	126,365	48,965	18	
Totals June				117		18,038	15	18,053		276		4,515,264	1,094,751	722	
Reported 31st May				101		15,336	15	15,350		296		3,490,865	1,387,119	617	
Totals May & June				218		33,374	15	33,389		572		8,006,129	3,081,870	1,334	
Corresponding date for 1892.				1,544		33,344	1,767	35,111	50	932				1,391	
1892.															
74	July 1	Laurentian	Liverpool			542		542	2			119,600	47,700	21	
75	do 1	Sicilian	Bristol			251		251				57,800	25,060	10	
76	do 1	Prussia	London			450		450	1			122,950	45,490	18	
77	do 2	Baltimore	Liverpool	94		304		304				80,640	34,240	12	
78	do 2	Memphis	London			588		588				149,330	60,290	21	
79	do 4	Polaris	do			1165		1165				50,750	19,550	7	
80	do 4	State Georgia	do			330		330				10,000	33,700	16	
81	do 5	Lake Ontario	Liverpool	70		225		225				50,150	20,470	9	
82	do 5	Pomeranian	Glasgow			423		423		43		104,570	36,560	19	
83	do 6	Dracena	London			100		100				48,080	15,090	6	
84	do 6	Hestia	Glasgow			384		384				78,714	36,560	15	
85	do 8	Dominion	Bristol			312		312				76,890	31,290	12	
86	do 8	Nunidean	Liverpool			420		420	4			92,650	37,910	17	
87	do 9	Oregon	do			200		200				43,100	20,060	4	
88	do 9	Montevideo	London			100		100		18		23,870	9,000	5	
89	do 11	Stabbenhuk	do			303		303				98,770	40,100	15	
90	do 12	Lake Huron	Liverpool	74		354		354				79,420	32,000	23	
91	do 13	Lena	London			572		572				141,080	54,430	19	
92	do 13	Indiana	Glasgow			302		302		56		107,390	47,390	15	
93	do 13					105		105				60,700	19,580	6	

LIVE STOCK SHIPMENTS.

65

95	do	18.	Toronto.....	Liverpool.....	303	.....	303	.....	9 09	.....	71,080	26,710	13
96	do	19	Lake Winnipeg	do	341	.....	241	.....	7 23	.....	53,040	20,300	10
97	do	19.	Grimu.....	London.....	163	.....	163	.....	4 89	.....	40,750	16,350	6
98	do	19.	Manitoba	Glasgow.....	116	.....	116	.....	3 48	1	26,080	10,080	6
99	do	19.	Austrian	London.....	181	.....	181	.....	5 43	.....	44,120	17,890	7
100	do	20.	Texas.....	Bristol.....	122	.....	122	.....	3 66	.....	26,260	10,510	5
101	do	20.	Tritonia.....	Glasgow.....	52	.....	52	.....	1 56	.....	13,000	5,200	4
102	do	21.	Wentmore.....	Liverpool.....	230	.....	230	.....	6 90	67	57,500	20,700	12
103	do	22.	Hurona.....	London.....	270	.....	270	.....	8 10	.....	68,970	23,440	10
104	do	22.	European.....	Newcastle.....	184	.....	184	.....	5 85	.....	50,690	16,090	7
105	do	22.	Mongolian.....	Liverpool.....	293	.....	293	.....	8 79	.....	68,000	26,350	12
106	do	23.	Warwick.....	Bristol.....	188	.....	188	.....	5 64	.....	47,000	18,000	8
107	do	24.	Lake Nepigon.....	Liverpool.....	318	.....	318	.....	10 48	.....	76,060	31,900	13
108	do	26.	Lake Superior.....	do	415	.....	415	.....	13 29	75	97,080	38,060	16
109	do	26.	Siberian.....	Glasgow.....	256	.....	256	.....	7 68	.....	72,600	27,460	13
110	do	26.	Canopus.....	Liverpool.....	293	.....	293	.....	8 79	.....	77,770	27,370	13
111	do	27.	Anarynthia.....	Glasgow.....	245	.....	245	.....	7 35	.....	61,250	22,050	9
112	do	27.	Brazilian.....	do	282	.....	282	.....	8 46	.....	33,880	12,740	12
113	do	29.	Peveril.....	London.....	244	.....	244	.....	7 32	.....	71,470	33,510	9
114	do	29.	Concordia.....	Bristol.....	207	.....	207	.....	6 21	.....	52,760	19,000	8
115	do	30.	Sarnia.....	Liverpool.....	302	.....	302	.....	9 06	.....	61,020	27,290	12
116	do	30.	Gerona.....	London.....	312	.....	312	.....	9 36	.....	82,070	28,770	11
117	do	30.	Mexico.....	Bristol.....	283	.....	283	.....	7 89	.....	66,400	23,600	10
Reported June 30, 1893				12,364	.....	12,364	.....	375 41	260	.....	3,056,754	1,177,060	502
				33,374	15	33,389	34	761 70	572	.....	8,006,129	3,081,870	1,339
Corresponding date 1892				45,738	15	45,753	.....	1,140 11	832	.....	11,061,883	4,258,980	1,841
				49,632	4,959	54,691	114	1,091 82	1,135	.....	.....	.....	.....
118	Aug.	2.	Sarmatian.....	Glasgow.....	446	.....	446	.....	13 38	55	105,600	35,460	20
119	do	2.	Barrowmore.....	Liverpool.....	394	.....	394	.....	11 82	.....	76,430	28,250	16
120	do	2.	British Crown.....	London.....	291	.....	291	.....	8 73	.....	87,300	30,000	11
121	do	2.	Mariposa.....	Liverpool.....	214	.....	214	.....	6 42	.....	47,580	19,180	9
122	do	5.	Laurentian.....	do	570	.....	570	1	17 10	.....	132,230	51,850	23
123	do	5.	Roarlian.....	London.....	395	.....	395	.....	11 85	.....	112,970	35,550	16
124	do	5.	Oxenholme.....	Liverpool.....	446	.....	446	10	13 68	.....	112,630	40,400	18
125	do	6.	Norse King.....	London.....	470	.....	470	.....	14 55	.....	124,100	40,450	19
126	do	8.	California.....	do	253	.....	253	.....	7 59	.....	63,500	23,300	10
127	do	9.	Lake Ontario.....	Liverpool.....	571	.....	571	.....	17 13	.....	128,270	48,980	22
128	do	9.	Buenos Ayrean.....	Glasgow.....	450	.....	450	.....	13 50	29	91,865	40,500	19
129	do	9.	Sicilia.....	Bristol.....	324	.....	324	.....	9 72	.....	77,800	29,420	14
130	do	10.	Hestia.....	Glasgow.....	384	.....	384	.....	11 52	53	96,714	38,050	19
131	do	10.	Virginian.....	Liverpool.....	730	.....	730	.....	21 90	.....	178,710	63,410	29
132	do	11.	Memnon.....	do	309	.....	309	.....	9 27	.....	80,260	27,140	11

* Animals were returned after being ashore and were re-shipped. See No. 70, June 28, Dec. 8.

RECORD of Live Stock shipped from Port of Montreal during 1893—Continued.

Number.	Date.	Steamer.	Destination.	SHEEP.			CATTLE.			HORSES.		SWINE.		Hay for Feed.	Grain for Feed.	Number of Men.
				Shipped.	Lost.	Fat.	Stockers.	Total.	Lost.	Shipped.	Lost.	Shipped.	Lost.			
1893.																
133	Aug. 11.	Storm King.	London.			450		450	1					118,992	40,220	18
134	do 12.	Numidian.	Liverpool			383		383	1					85,670	34,640	14
135	do 13.	Oregon.	do			270		270						59,940	31,520	11
136	do 15.	Brieoe.	London.			172		172						55,080	15,080	7
137	do 16.	Pickhuben	do			400		400						100,000	32,000	15
138	do 16.	Baltimore.	Liverpool			400		400						101,800	36,260	16
139	do 16.	Pomeranian.	Glasgow.			273		273			10			59,720	24,750	12
140	do 17.	Indrani.	do			362		362						78,714	33,280	14
141	do 17.	Fremona.	London.			233		233						63,850	20,850	10
142	do 17.	Montevidean.	do			385		385						92,040	30,910	15
143	do 17.	Lake Huron.	Liverpool			424		424						93,910	33,060	16
144	do 17.	Dominion.	Bristol			146		146						34,960	12,650	6
145	do 17.	State of Georgia.	Newcastle			337		337						86,870	27,845	15
146	do 19.	Dracena.	Bristol			160		160						40,970	14,480	6
147	do 20.	Iona.	London.			552		552						138,280	38,320	22
148	do 20.	Toronto.	Liverpool			374		374						82,890	29,200	16
149	do 22.	Polaris.	Newcastle			232		232						60,320	19,890	9
150	do 23.	Lake Winnipeg.	Liverpool			406		406						90,905	32,920	15
151	do 24.	Tretonia.	Glasgow.			257		257			61			71,110	22,893	12
152	do 24.	Manitoba.	do			179		179			25			45,160	16,300	8
153	do 26.	Mongolian.	Liverpool			334		334			9			81,410	37,954	14
154	do 27.	Austrian.	London.			210		210						53,290	19,020	8
155	do 27.	Texas.	Bristol			300		300						68,300	24,270	12
156	do 30.	Stubbenhuk.	London.			240		240						65,160	13,500	9
157	do 30.	Siberian.	Glasgow.			239		239						65,100	21,600	14
158	do 30.	Lake Superior.	Liverpool			554		554						131,460	40,590	23
159	do 31.	Hurona.	London.			554		554						137,900	49,690	22
Shipped in August.				45		15,073	10	15,083		291				3,680,792	1,308,622	615
Reported July 31, '93				667		46,738	15	46,753	41	832	3			11,061,863	4,208,930	1,841
Total to date.				712		60,811	25	60,836		1,123				14,742,675	5,507,552	2,456
Same date, 1892.				15,703		48,701	10,911	74,612	166	1,323			96			

160	Sept.	1.	Glasgow	341	10 23	86,200	27,280
161	do	2.	Amaruthia.	260	7 80	66,100	21,000
162	do	3.	Brazilian...	234	7 02	58,028	21,048
163	do	3.	Wentmore.	260	7 80	66,310	23,700
164	do	5.	Mexico.	370	11 10	98,200	17,568
165	do	5.	Grimm	232	6 96	60,715	21,920
166	do	6.	Sarmatian	210	6 30	48,750	14,990
167	do	7.	Mariposa.	100	3 00	27,500	8,000
168	do	7.	Kent.	507	15 21	127,140	42,930
169	do	7.	Gerons	188	5 64	43,880	16,960
170	do	7.	Warwick	292	8 76	66,160	23,530
171	do	9.	Laurentian.	92	2 76	26,730	8,410
172	do	11.	Rosarian.	345	10 35	77,670	23,400
173	do	13.	Lake Ontario.	304	9 12	67,260	29,960
174	do	13.	Hestia.	336	10 08	77,940	26,040
175	do	13.	Buenos Ayrean	277	8 31	72,090	34,600
176	do	15.	Canopus	54	1 62	15,380	4,880
177	do	15.	Memphis	288	8 64	64,240	25,880
178	do	16.	Nunidean.	127	3 81	27,570	11,450
179	do	17.	Oregon	471	14 13	106,070	19,000
180	do	20.	Lake Huron.	389	11 67	93,290	34,370
181	do	20.	Hibernian.	101	3 03	26,760	10,010
182	do	21.	Sicilia.	388	11 64	101,638	34,680
183	do	21.	Indrani.	340	12 13	84,300	36,710
184	do	24.	Toronto	241	7 23	60,650	22,736
185	do	26.	State of Georgia	505	15 15	126,970	14,600
186	do	27.	Lake Winnipeg	480	14 40	121,735	19,630
187	do	27.	Montevidean	160	4 80	40,460	14,400
188	do	28.	Dominion.	359	10 79	90,314	33,290
189	do	28.	Manitoban	482	14 46	120,500	43,980
190	do	29.	Tretonia	446	13 38	117,900	35,040
191	do	30.	Virginian.	526	15 78	131,500	29,000
		30.	Iona	9,705	233 08	2,395,900	750,342
				60,811	1,593 05	14,742,675	5,567,532
			Reported Aug. 31, '93	70,516	1,886 13	17,138,575	6,317,894
			Same date, 1892..	70,601	1,737 54	17,138,575	2,858

Record of Live Stock shipped from Port of Montreal, during 1893—Concluded.

Number.	Date.	Steamer.	Destination.	CATTLE.			Swine.	Houses.		Fees Collected. \$ cts.	Hay for Feed.	Grain for Feed.	Number of Men.
				Shipped.	Lost.	Shipped.		Lost.	Shipped.					Lost.
1893.													
192	Oct. 1	Prenoma	London.	458		458				13 74	132,350	40,690	18
193	do 4	Siberian	Glasgow	488						14 64	121,060	44,180	20
194	do 4	Austrian	London.	276		276			23	8 28	82,010	27,600	16
195	do 4	Lake Superior	Liverpool	377		377		139		12 70	90,970	50,330	16
196	do 5	Amarynthia	Glasgow	250		250				7 50	62,500	22,000	9
197	do 6	Texas	Bristol	187		187				4 11	36,720	12,320	6
198	do 8	Hurma	London.	763		763				22 80	218,000		30
199	do 8	Sarnia	Liverpool	291		291		106		9 79	73,750	27,030	13
200	do 10	Brazilian	London.	435		435				13 65	139,794	13,970	18
201	do 11	Pomeranian	Glasgow	415		415			47	12 40	114,540	24,600	15
202	do 11	Lake Nepean	Liverpool	334		334				10 02	100,000		13
203	do 12	Warwick	Glasgow	334		334				5 04	56,400	40,330	8
204	do 14	Laurentian	Liverpool	579		579				17 37	130,275	10,130	22
205	do 15	Hestia	Glasgow	305		305				16 95	134,045		14
206	do 17	Gerona	London.	785		785				23 55	235,500		31
207	do 18	Lake Ontario	Liverpool	346		346				10 38	103,800		13
208	do 18	Mexico	Bristol	313		313		27		9 66	81,450	27,370	12
209	do 19	Sarnatian	Glasgow	661		661			39	19 83	194,550	30,000	25
210	do 21	Nunidean	Liverpool	428		428				12 84	125,100		16
211	do 22	Oregon	do	253		253				7 20	43,130	22,400	10
212	do 25	Lake Huron	do	635		635		335		22 40	173,640	17,910	26
213	do 26	Indrani.	Glasgow	397		397			36	11 91	120,100	4,000	16
214	do 26	Rosarian	London.	181		181				5 43	33,791	5,850	8
215	do 31	Toronto	Liverpool	339		339		269		12 86	96,106	25,870	10
216	do 31	Canguis	do	240		240				7 20	66,000	16,800	12
Total for October.				9,954		9,954		876		307 38	2,818,322	404,400	306
Previously reported.				70,516		70,541		905		1,886 13	17,138 57	6,317,804	2,808
Total to date.				80,470		80,405		1,781		2,103 51	19,957 097	6,782,294	3,254
Corresponding period last year				76,303		76,390		15,914		1,003 44			

217	Nov.	1.	Lake Winnipeg	Liverpool	302	155	302	9 06	76,400	20,230	11
218	do	1.	Hibernian	Glasgow	155	298	155	4 65	38,250	10,810	6
219	do	4.	Mongolian	Liverpool	298	197	298	8 94	89,400	26,940	14
220	do	4.	Aleides	Bristol	197	281	197	6 71	89,100	15,760	8
221	do	6.	Tritonia	Glasgow	281	212	281	8 43	84,300	18,300	14
222	do	8.	Lake Superior	Liverpool	212	33	212	11 53	67,140	22,360	12
223	do	8.	Dominion	Bristol	33	185	33	0 99	9,000	3,000	1
224	do	8.	Siberian	Glasgow	185	269	185	5 55	44,810	28,100	11
225	do	9.	Iona	London	269	205	269	8 07	82,000	24,210	10
226	do	9.	Montevideo	do	205	40	205	6 15	61,960	18,600	10
227	do	12.	Sarnia	Liverpool	40	112	40	1 20	12,000	3,000	2
228	do	15.	Austrian	London	112	24	112	3 35	35,000	11,200	4
229	do	15.	Lake Nepigon	Liverpool	24	41	24	12 14	45,000	12,000	7
230	do	16.	Freemona	London	41	314	41	1 23	12,300	4,000	2
231	do	18.	Laurentian	Liverpool	314	60	314	9 42	89,570	6,460	14
232	do	19.	Huron	do	60	55	60	3 24	22,000	7,000	3
233	do	19.	Brazilian	Glasgow	55	44	55	0 79	2,000	800	1
234	do	21.	Hestia	Liverpool	44	2,827	44	1 52	21,300	7,100	2
235	do	22.	Lake Ontario	do	2,827	80,495	2,827	104 43	11,520	4,000	2
		Total, November		1,962	25	2,827	141	2,193 51	983,080	238,870	134
		Previously reported		1,781	25	80,495	1516	1,516	1 19,967,087	6,782,264	3,264
		Total for 1893		3,743	25	83,322	2,297 94	1,660	1 20,850,177	7,021,164	3,388
		Shipped in 1892		15,914	19,596	98,731	646	1,984 70	25,229,480	7,448,079	3,863

* Went on Buenos Ayrean.

GEO. H. POPE,
E. B. MORGAN,
Inspectors.

MONTREAL, 22nd November, 1893.

Record of Live Stock shipped from Port of Montreal, during 1893—*Concluded.*

Number.	Date.	Steamer.	Destination.	SHEEP.		PAT.	CATTLE.		Fees Collected.	HORSES.		SWINE.		Hay for Feed.	Grain for Feed.	Number of Men.
				Shipped.	Lost.		Stockers.	Total.		Lost.	Shipped.	Lost.	Shipped.				Lost.
1893.																
102	Oct. 1	Fremont	London.	.....	.....	458	.....	458	8 cts.	.....	.....	.....	.....	132,350	40,660	18
193	do 4	Siberian	Glasgow	.....	.....	488	.....	488	13 74	.....	.....	.....	.....	121,000	41,180	20
194	do 4	Austrian	London.	.....	.....	276	.....	276	8 28	.....	.....	.....	.....	90,370	30,380	10
195	do 4	Lake Superior	Liverpool	139	2	327	.....	327	12 70	.....	.....	.....	.....	62,500	22,000	16
196	do 5	Amurynbina	Glasgow	.....	.....	250	.....	250	7 30	.....	.....	.....	.....	36,720	12,320	9
197	do 6	Texas	Bristol	.....	.....	137	.....	137	4 11	.....	.....	.....	.....	218,000	.....	6
198	do 8	Huron	London.	.....	.....	763	.....	763	22 89	.....	.....	.....	.....	73,750	27,030	30
199	do 8	Sarnia	Liverpool	106	.....	291	.....	291	9 79	.....	.....	.....	.....	139,794	13,970	13
200	do 10	Brazilian	London.	.....	.....	455	.....	455	13 45	.....	.....	.....	.....	114,540	24,680	18
201	do 11	Pomeranian	Glasgow	.....	.....	415	.....	415	12 45	.....	.....	.....	.....	100,000	.....	15
202	do 11	Lake Nepegon	Liverpool	.....	.....	334	.....	334	10 02	.....	.....	.....	.....	56,400	.....	13
203	do 12	Warwick	Glasgow	.....	.....	188	.....	188	5 64	.....	.....	.....	.....	130,275	40,530	8
204	do 14	Laurentian	Liverpool	.....	.....	579	.....	579	17 37	.....	.....	.....	.....	134,000	10,130	22
205	do 15	Hosita	Glasgow	.....	.....	365	.....	365	10 05	.....	.....	.....	.....	235,500	.....	14
206	do 17	Genova	London.	.....	.....	785	.....	785	23 55	.....	.....	.....	.....	103,800	.....	31
207	do 18	Lake Ontario	Liverpool	.....	.....	346	.....	346	10 38	.....	.....	.....	.....	81,450	27,970	13
208	do 18	Mexico.	Bristol	.....	.....	313	.....	313	9 46	.....	.....	.....	.....	194,550	30,000	12
209	do 19	Sarnatian	Glasgow	27	.....	601	.....	601	19 83	.....	.....	.....	.....	128,100	.....	25
210	do 21	Nunimidean.	Liverpool	.....	.....	428	.....	428	12 84	.....	.....	.....	.....	63,120	22,000	10
211	do 22	Oregon	do	325	.....	253	.....	253	7 59	.....	.....	.....	.....	173,640	17,910	26
212	do 25	Lake Huron	do	.....	.....	635	.....	635	22 40	.....	.....	.....	.....	150,100	4,000	16
213	do 26	Indiana	Glasgow	.....	.....	397	.....	397	11 91	.....	.....	.....	.....	53,791	3,850	8
214	do 26	Rossian	London.	.....	.....	181	.....	181	5 43	.....	.....	.....	.....	36,166	25,850	15
215	do 31	Toronto	Liverpool	209	.....	339	.....	339	12 86	.....	.....	.....	.....	66,000	16,800	12
216	do 31	Canopus	do	.....	.....	240	.....	240	7 30	.....	.....	.....	.....	2,818,022	464,400	383
Total for October.				876	.....	9,954	.....	9,954	307 28	.....	.....	.....	.....	17,138,57	6,317,804	2,858
Previously reported				965	.....	70,516	.....	70,541	1,886 13	.....	.....	.....	.....	19,957,007	6,782,204	3,254
Total to date				1,781	.....	80,470	.....	80,495	2,193 51	.....	.....	.....	.....	.....	.....	.....
Corresponding period last year				15,914	.....	70,303	18,799	86,192	1,903 84	1,628	.....	1,292	.....	.....	.....	.....

217	Nov.	1.	Lake Winnipeg	Liverpool	302	302	9 06	20,230	11
218	do	1.	Hibernian	Glasgow	155	155	4 65	76,400	6
219	do	4.	Monrolian	Liverpool	298	298	8 94	38,280	14
220	do	4.	Alcides	Bristol	197	197	6 71	88,940	8
221	do	6.	Tritonia	Glasgow	281	281	8 43	89,100	14
222	do	8.	Lake Superior	Liverpool	212	212	11 53	84,300	12
223	do	8.	Dominion	Bristol	33	33	0 99	67,140	1
224	do	8.	Siberian	Glasgow	185	185	5 55	9,000	11
225	do	9.	Iona	London	269	269	8 07	44,810	10
226	do	9.	Montevidean	do	205	205	6 15	82,000	10
227	do	12.	Sarmia	Liverpool	40	40	1 20	24,310	10
228	do	15.	Austrian	London	112	112	3 36	61,960	10
229	do	15.	Lake Nepigon	Liverpool	24	24	12 14	35,000	4
230	do	16.	Freemona	London	41	41	1 23	11,200	7
231	do	18.	Laurentian	Liverpool	314	314	9 42	45,000	2
232	do	19.	Hurons	do	60	60	3 24	12,300	14
233	do	21.	Brazilian	do	55	55	0 79	89,570	3
234	do	21.	Hestia	Glasgow	55	55	1 65	22,000	1
235	do	22.	Lake Ontario	Liverpool	44	44	1 32	21,300	2
Total, November				2,827	2,827	104 43	983,080	238,870	134
Previously reported				80,470	25	2,193 51	19,957,097	6,782,294	3,254
Total for 1893.				83,297	25	2,297 94	20,850,177	7,021,164	3,388
Shipped in 1892.				79,135	19,596	1,984 70	25,229,490	7,448,079	3,863

* Went on Buenos Ayrean.

GEO. H. POPE,
E. B. MORGAN,
Inspectors.

MONTREAL, 22nd November, 1893.

APPENDIX No. 9.

STATEMENT relating to the Wharfs under the control of the Department, on
30th June, 1893.

(Rules established for the government of wharfs, 12th June, 1889.)

Locality.	Wharfinger.	Date of Appointment of Wharfinger.	Remuneration Allowed.	Amount deposited to credit of Receiver General.
<i>Ontario.</i>				\$ cts.
Cockburn Island	Alfred Monek	May 30, 1889	25 p.c. of collections.	42 86
Goderich	Vacant			
Inverhuron	do		25 p.c. of collections.	
Kingsville	S. A. King	May 5, 1890	25 do	68 44
Morpeth	Thos. McCallum	Aug. 25, 1891	25 do	
Rondeau	W. R. Fellowes	Dec. 17, 1888	25 do	47 30
Sault Ste. Marie	W. H. Plummer	Jan. 2, 1890	\$100 per annum do	491 69
Southampton	James Johns	Oct. 31, 1892	25 p.c. of collections.	3 06
Summerstown	Don Ward	June 4, 1891	25 do	
Warton	H. R. A. Ely	Dec. 10, 1890	25 do	161 49
<i>Quebec.</i>				
Agnes	L. A. Roy	Nov. 27, 1891	25 p.c. of collections.	
Anse St. John	J. Desgagne	June 10, 1893	25 do	
Baie St. Paul	C. Bouchard	Aug. 25, 1891	25 do	
Baie St. Paul, Isolated Block	A. Simard	Aug. 25, 1891	25 do	
Beauport	Felix Guillot	Nov. 21, 1891	25 do	
Berthier	J. R. Mercier	Jan. 11, 1893	25 do	
Carleton	Jos. Cauchon	June 4, 1889	\$50 per annum	70 80
Cascades	Nereé Moreau	Aug. 20, 1892	25 p.c. of collections.	
Chicoutimi	Juste Ouellette	May 2, 1893	25 do	71 50
Grand River	John Carberry	Sept. 23, 1892	25 do	106 20
Isle aux Grues	Jos. Painchand	Feb. 17, 1890	25 do	
Lacolle	Vacant		25 do	2 00
Les Eboulements	C. Tremblay	June 2, 1893	25 do	
L'Islet	Octave Morin	Feb. 8, 1893	25 do	
Longueuil	D. Brissette	Mar. 23, 1893	25 do	
Murray Bay	Vacant			
New Carlisle	John C. Hall	June 4, 1889	25 p.c. of collections.	263 38
Perce	T. W. Flynn	Jan. 19, 1893	25 do	
Port Daniel	John Enright	Sept. 11, 1890	\$50 per annum	124 75
Rivière Ouelle	J. H. dit Beaulieu	Nov. 28, 1892	25 p.c. of collections.	
Rivière du Loup	Louis Pinze	Sept. 16, 1891	25 do	62 00
St. Alphonse de Bagotville	Abel Tremblay	July 7, 1891	25 do	
St. Jean d'Orléans	Chas. Langlois	Dec. 16, 1892	25 do	
Ste. Océile du Bic	L. N. Côté	July 20, 1891	25 do	
Tadoussac	A. Christiansen	July 7, 1891	25 do	42 75
Trois Pistoies	Nap. Rioux	Sept. 16, 1891	25 do	
St. Thomas de Montmagny	Eug. Hamond	May 20, 1892	25 do	
<i>New Scotus.</i>				
Arissig	John McInnis	Aug. 27, 1892	25 p.c. of collections	
Avonport	Robert Shaw	Nov. 23, 1888	25 do	
Barrington	S. W. Crowell	Aug. 12, 1891	25 do	246 90
Bayfield	Edward Randall	Aug. 25, 1888	25 do	
Belliveau's Cove	St. Clair Thériault	Nov. 24, 1892	25 do	116 00
Broad Cove	John Teal	June 12, 1893	25 do	

STATEMENT relating to Wharfs, &c.—*Concluded.*

Locality.	Wharfinger.	Date of Appointment of Wharfinger.	Remuneration Allowed.	Amount deposited to credit of Receiver General.
<i>Nova Scotia—Conclude 1.</i>				\$ cts.
Broad Cove Marsh	Hugh McDonald	Oct. 19, 1892.	25 p. c. of collections.	
Brooklyn	F. T. Gardiner	Oct. 20, 1882.	20 do	
Canada Creek	C. E. Eaton	Nov. 23, 1888.	25 do	
Cape Cove	M. A. Doucette	Dec. 7, 1891.	25 do	62 23
Centreville	W. M. B. Dakin	Aug. 25, 1888.	25 do	48 00
Chipman's Brook	Jas. Misaner	Nov. 23, 1888.	25 do	21 51
Church Point	Chas. F. Belliveau	Aug. 20, 1892.	25 do	85 59
Cow Bay	Arch. McKinnon	Apr. 15, 1879.	7½ do	2,044 51
Cranberry Head	Abram Thurston	Feb. 16, 1889.	25 do	
Delap's Cove	R. W. McCaul	Nov. 28, 1889.	25 do	
Digby	H. B. Short	Jan. 9, 1891.	25 do	560 15
Eagle Head	Nathan Leslie	do 9, 1889.	25 do	
East Bay	Donald McInnis (Ronald's son).	Apr. 5, 1886.	50 do	
East River, Sheet Harbour	Malcolm McFarlane	May 20, 1890.	25 do	31 47
Grand Narrows, Victoria Co.	John P. McNeill	Aug. 25, 1888.	25 do	
Grand Narrows, Cape Breton Co.	E. A. McNeill	Nov. 6, 1888.	25 do	
Hall's Harbour	Sydney Roscoe	do 23, 1888.	25 do	
Hampton	Judson Foster	Aug. 25, 1888.	25 do	17 57
Harbourville	C. O. Cook	Nov. 23, 1888.	25 do	44 09
Irish Cove	John Cash	Sept. 17, 1892.	25 do	
Maitland, Hants Co.	C. S. Stuart	Sept. 5, 1888.	25 do	103 25
Maitland, Yarmouth Co.	J. W. Raymond	Apr. 14, 1890.	25 do	42 75
Margaretsville	T. J. Downie	Aug. 25, 1888.	25 do	75 58
Meteghan Cove	H. F. Deveau	Sept. 15, 1888.	25 do	73 70
Meteghan River	Urbain Doucette	Jan. 3, 1883.	20 do	175 32
Militia Point	D. McIntosh	Aug. 20, 1892.	25 do	
Morden	Wm. Minnis	Nov. 23, 1888.	25 do	35 15
Oak Point	Vacant			200 00
Ogilvie	R. S. Armstrong	Nov. 23, 1888.	25 do	
Parrsboro	Thompson Tipping	do 26, 1888.	25 do	
Pickett's Wharf	Andrew Bishop	Dec. 24, 1884.	25 do	73 08
Plympton	Wm. Smith	Aug. 8, 1890.	25 do	
Point Brûlé	David Stevenson	Nov. 23, 1888.	25 do	
Port George	R. G. Anderson	Oct. 14, 1892.	25 do	88 16
Port Greenville	Geo. Hatfield	Feb. 17, 1893.	25 do	
Port Hood	A. V. McDougald	May 17, 1892.	25 do	159 97
Port Lorne	Samuel Beardsley	Aug. 25, 1888.	25 do	49 19
Salmon River	J. M. Deveau	Nov. 25, 1890.	25 do	
Saulniersville	John T. Saulnier	Aug. 25, 1888.	25 do	29 00
Tancook Island	Joseph Pearl	Dec. 7, 1892.	25 do	
Tracadie	J. M. Hall	Nov. 6, 1888.	25 do	
Tusket Wedge	Jas. Cothreau	Feb. 16, 1889.	25 do	
Victoria	William Brown	do 11, 1889.	25 do	11 48
Wallace	Don McKenzie	Dec. 16, 1892.	25 do	
West Pubnico	N. A. D'Entremont	Apr. 9, 1890.	25 do	
West River, Sheet Harbour	Malcolm McFarlane	Sept. 3, 1889.	25 do	
White Point	Elisha West	Jan. 9, 1889.	25 do	
<i>New Brunswick.</i>				
Buctouche	J. J. LeBlanc	May 2, 1892.	25 do	12 09
Campbellton	Alfred J. Venner	June 10, 1893.	25 do	77 83
Clifton, Stonehaven	J. W. Dealey	May 13, 1893.	25 do	
Dalhousie	W. J. Smith	June 27, 1891.	25 do	102 49
Hopewell Cape	Wm. Hamilton	Apr. 9, 1890.	25 do	86 45
Quaco	W. H. Rourke	July 15, 1892.	25 do	
St. Louis	E. Comeau	May 2, 1893.	25 do	
<i>Prince Edward Island.</i>				
Annandale	James Taylor	July 2, 1885.	25 do	81 82
Bay View	Joseph Harrington	Oct. 2, 1885.	25 do	15 96

STATEMENT relating to Wharfs, &c.—Continued.

Locality.	Wharfinger.	Date of Appointment of Wharfinger.	Remuneration Allowed.	Amount deposited to credit of Receiver General.
<i>P. E. Island—Concluded.</i>				\$ cts.
Belfast	Thos. McLennan	July 21, 1890	25 p.c. of collections	81 05
Brush Wharf	Levi R. Ings	Sept. 18, 1885	25 do	167 93
Campbell's Cove	Angus McIntyre	Oct. 17, 1888	25 do	
Chapel Point	Ronald McCormack	Sept. 18, 1885	25 do	29 41
China Point	W. S. N. Crane	do 18, 1885	25 do	32 30
Clifton	Wm. McKay	do 22, 1886	25 do	10 79
Crapaud and Victoria Pier	James Day	May 12, 1890	25 do	129 73
Georgetown	James Bourke	July 2, 1885	25 do	17 27
Hickey's Wharf	R. Webster	do 31, 1891	25 do	13 02
Higgin's Shore	G. G. Henry	Nov. 9, 1891	25 do	
Hurd's Point	R. Robblee	Oct. 6, 1888	25 do	36 46
Kier's Shore	H. S. McNutt	Nov. 3, 1885	25 do	100 34
Lambert	Angus McQueen	Oct. 24, 1891	25 do	110 79
Lewis Point	Joseph A. Macdonald	Apr. 15, 1891	25 do	85 33
McGee's Island	Norman Gallant	Nov. 9, 1891	25 do	
Mink River	B. Clow	June 30, 1892	25 do	
Murray Harbour, South	R. Murley	Aug. 25, 1891	25 do	16 00
Nine Mile Creek	Edward Harrington	Oct. 29, 1885	25 do	
North Cardigan	Donald McIntyre	July 2, 1885	25 do	40 73
Pinette	Vacant		25 do	11 18
Pownal	Alex. McRea	Oct. 2, 1885	25 do	60 77
St. Mary's Bay	C. H. Lewellin	July 2, 1885	25 do	27 00
Souris	B. McEachern	June 3, 1884	25 do	
South Rustico, Oyster Bed				
Bridge	Joseph Doucette	Oct. 2, 1885	25 do	39 50
Stevens and Montague	Angus McQueen	do 24, 1891	25 do	
Sturgeon River	Bernard Kearney	Sept. 18, 1885	25 do	42 17
Tignish River	Geo. Conroy	Oct. 2, 1891	25 do	14 75
Vernon River	J. G. McKenzie	do 19, 1885	25 do	127 84
Wood Island	M. H. McMillan	May 16, 1889	25 do	

RECAPITULATION.

	\$ cts.
Ontario	815 73
Quebec	733 53
Nova Scotia	4,393 66
New Brunswick	278 86
Prince Edward Island	1,292 14

Total wharfage dues collected..... 7,513 92

ADD: Fees received by undermentioned harbour masters in excess of remuneration allowed:

Harbour Masters—Sorel, Que.	\$ 22 50
do St. Johns, Que.	48 00
do Cape Canso, N.S.	15 00
do International Pier, N.S.	17 00
do South Bar, N.S.	15 50
do Yarmouth, N.S.	2 00
do Chatham, N.B.	148 00
do Nanaimo, B.C.	90 00
	358 00

Total Revenue from Wharfs and Harbours..... 7,871 92

N.B.—With exception of Cow Bay and Digby, wharfingers are not required to forward returns of collections till end of calendar year. This statement only shows amounts received by department and placed to credit of Receiver General up to 30th June, 1893.

APPENDIX No. 10.

DOMINION GOVERNMENT MESSENGER PIGEON SERVICE.

To the
Marine and Fisheries Department.

HALIFAX, N. S., 29th September, 1893.

SIR,—In accordance with your agent's request, I have the honour to submit this report on the training of the messenger pigeons since my last report, dated 3rd October, 1892, and to include only up to 30th June this year.

Lieut. Croker, the officer immediately in charge of the training, left this station in October last year, and his place, with my approval, has been voluntarily assumed by Sergeant Uriah Mulholland, R. E., the director of signals, under whose directions the training has proceeded most energetically this year, no opportunities for sending pigeons out by steamers, etc., having been lost, excepting through unfavourable weather or unfavourable times of departure of the vessels.

On 27th March, 1893, Private Stenton, 1st Leicester Regiment, the caretaker, was withdrawn from these duties, and relieved by Private Weaver, 1st Liverpool Regiment, the former being required for immediate embarkation with his regiment.

At the date of the last report, 3rd October, 1892, there were 32 birds in the loft.

At the present date, *i. e.*, 29th September, 1893, there are in the loft at Marine and Fisheries wharf 5 birds, and in the loft at the citadel signal station, 20 birds.

This latter loft was conceived and carried out by Sergt. Mulholland, who deserves the greatest credit for the skill he has displayed in his endeavour to make this season's training a success. This loft has been made up by transferring birds when about a month old, and has proved a great success, as the birds are under constant supervision day and night, and no bird returning with a message can possibly remain undetected for a greater period than ten minutes, and, as a rule, only a few minutes or less.

The total cost of the loft has not been more than \$5 for labour and material.

On the 11th February this year the actual training was commenced, all the birds, old and young, being assumed by Sergt. Mulholland as totally untrained, an assumption which was afterwards fairly justified in the fact of 4 birds let off from the steamer "Newfield" on 19th March, 1893, a distance of 25 to 40 miles, on the occasion of her search for the steamer "Sarnia," did not return, although their supposed previous flights was in each case 100 miles.

Between that date (11th February) and 29th June, there have been 85 flights, according to the rules of training laid down by General Cameron. The average number of birds in each flight was 7 and 8, the actual number of birds being 636.

The greatest distance of any of these flights, up to 29th June, was from the steamer "Worcester," on the 5th June, 25 miles south-easterly, and the number of birds, 11. Of these 11 birds 6 never returned, 1 returned 3 weeks afterwards, 1 returned 5 days afterwards, 1 returned 3 days afterwards, 1 was returned in a box from Canso, and only 1 bird returned the same day.

All these birds were carefully trained up to this distance, and the heavy loss appeared to warrant closing the training at once, but with perseverance and patience with the remainder of the birds, I have met with more gratifying success, especially with those from the citadel loft, and I have strong hopes now of having about 6 birds qualified to return from Sable Island during the next month at the outside.

On the 30th June, 1893, there were in the Marine and Fisheries loft 14 birds, and in citadel loft 16, making a total of 30.

During the period 3rd October, 1892, to 30th June, 1893, there have been lost in training from citadel loft, 3; Marine and Fisheries wharf loft, 30. There have

died at citadel 4, and at Marine and Fisheries wharf, 2, making a total loss of 41 birds.

At the date of the present caretaker, Private Weaver, taking over the duties, 27th March, 1893, there were in the Marine and Fisheries loft 52 birds, and citadel loft, 2 birds.

Both lofts are kept in a scrupulously clean condition, and the rules of General Cameron faithfully attended to by the caretaker, Private Weaver, who also shows great attention and interest in his work.

I have also, during the period included in this report, had occasion to write to General Cameron for advice on certain points in connection with the training, etc., and my thanks are due that officer for his full and explicit replies on each occasion.

I hope to submit to you another report to include from 1st July, 1893, to 31st October next, and which it is hoped will contain results proving the necessity, or otherwise, of continuing the training.

I have the honour to be, sir,

Your obedient servant,

L. J. DOPPING-HEPENSTAL,

Capt. R. E., Superintendent of Signals.

REPORT ON TRAINING OF MESSENGER PIGEONS.

HALIFAX, 1893.

1st. The figures for 1893 are as follows, viz. :—

In loft, January 1st, 1893,—

Birds hatched 1890	7
" 1891	4
" 1892	17
" 1893	67

Available total 95

Lost during 1893,—

From loft	7
Sold by order Marine and Fisheries Department	2
Died	17
In training	55

81

Birds remaining in loft 31st December, 1893 14

Available total, 1893 95

2nd. The pigeons were trained at varying distances, as shown on Table A (attached), which is a summary from the pigeon training chart kept at the signal station.

3rd. The losses during training amounted to 55.

Details as regards these losses are given on Table B (attached). It will be noticed that these 55 losses occurred in 24 separate flights, and that in every one of these flights some of the birds reached their destination,—

(a.) March 16th, 1893.—Thirty miles—all 4 birds were lost, due to strong north gale.

(b.) January 21st, 1894.—Sable Island.—Both birds were lost. This case is explained in the extract from the newspapers marked C (attached.)

4th. As regards Sable Island,—

(a.) Seven pigeons were left on the island on 23rd November, 1893. They were liberated on 28th November, 1893.

Two of them (Nos. 113 and 119) reached Halifax on the 29th and 30th November, 1893, as reported by Capt. Dopping-Hepenstel, in his letter from this office, dated 9th December, 1893.

The remaining 5 birds have not been heard from since, and are presumably lost.

(b.) The two successful pigeons (Nos. 113 and 119) were taken to Sable Island by ss. "Newfield" a second time and left on the island on 3rd January, 1894.

They were liberated 21st January, 1894, at 9.30 a.m., the wind being east and blowing a gale (the velocity being 30 miles per hour) at the time. On the same day No. 119 flew on board the American schooner "Mabel Leighton," then in lat. 42°30', long. 65°5' (about 150 miles south-south-west of Halifax.) The schooner did not put into port till 11th February, so that the intelligence of the wreck of the "Robert J. Edwards" on Sable Island on 12th January, was considerably delayed. However, but for the pigeons it would not have been known till some months later. The delay in liberating the birds, from 12th January to 21st January, can safely be attributed to unfavourable weather, as Mr. Boutilier, the superintendent of the island, had been carefully instructed as to the necessary conditions of the weather for letting the birds fly.

Had the wind at the time been, however, east south-east instead of east, I am satisfied both birds (113 and 119) would have made very quick time to Halifax.

D. MILLS,
Capt. R. E., Superintendent of Signals.

TABLE A.—Showing details of flights in which pigeons were lost during 1893 training.

Distance of flight in Miles.	Date of flight.	Number of pigeons.		Circumstances.
		Flown.	Lost.	
	1893.			
1	Mar. 16	10	1	From citadel to Marine and Fisheries loft.
1	" 28	13	1	" " " "
1	Apr. 18	11	4	" Garrison church to " "
4	Mar. 7	4	1	" Steam launch in harbour.
4	Apr. 7	7	1	" " " "
4	" 24	14	2	" " " "
4	July 7	8	1	" Rifle range camp to McNabb Island.
15	May 27	12	2	" SS. " Worcester."
21	June 22	10	6	" Chez. K., against strong wind.
25	" 5	12	6	" SS. " Worcester." Of remaining 6 birds 1 was returned in box from Canso, 1 was 7 weeks late, 1, 5 days late; 2, 3 days late.
25	Aug. 21	8	4	" "Carrol" in strong gale.
30	July 13	7	2	" "Newfield."
30	Mar. 16	4	4	" " in search of "Sarnia — strong gale—north.
40	July 31	13	3	" "Worcester."
40	Aug. 15	11	1	" "Alpha."
40	" 21	11	2	" "Carrol"—strong gale.
50	Oct. 11	4	1	" "Lansdowne."
60	" 11	4	1	" " " "
100	Sept. 12	5	1	" "Fastnett."
130	Oct. 16	6	2	" "Lansdowne."
135	Sept. 18	4	1	" "Fastnett," off Canso.
135	" 25	8	1	" " " "
180	Nov. 28	7	5	" Sable Island.
180	1894. Feb. 21	2	2	" " "
		195	55	

APPENDIX

STATEMENT relative to Life-Boat Stations

Stations.	Established.	Coxswain.	Number of Crew.	Salary of Coxswain.	Wages of Crew.
Blanche, N.S.	Sept. —, 1889	W. A. B. Smith.	6	\$75 per annum and \$1.50 for each drill.	\$1.50 each drill, twice a month.
Cape Sable, N.S.		Light-keeper.	No organized crew.		
Cobourg, Ont.	Nov. 7, 1882	D. Rooney.	6	\$75 per annum and \$1.50 for each drill.	\$1.50 each drill, twice a month.
Collingwood, Ont.	Sept. 2, 1885	P. Doherty.	6	do	do
Devil's Island, N.S.	1885	Fredk. Edward.	6	do	do
	Reorganized in 1890.				
Duncan's Cove, N.S.	1886	R. E. Monk.	6	do	do
Goderich, Ont.	Oct. 21, 1886	Wm. Babb.	6	do	do
Herring Cove, N.S.		James Dempsey.	No organized crew.		
Mud Island, N.S.		Jacob Pitman.	do	\$80	
Pelé Island, Ont.		A. Henning.	6	\$75 per annum and \$1.50 for each drill.	\$1.50 each drill, twice a month.
Pictou Island, N.S.	Nov. 23, 1889	D. McLean.	6	do	do
Poplar Point, Ont.	April 20, 1883	L. Spafford.	6	do	do
Port Hope, Ont.	Nov. 6, 1889	C. R. Nixon.	6	do	do
Port Mouton, N.S.	do —, 1889	J. Maxwell.	6	do	do
Port Rowan, Ont.	Oct. 19, 1883	J. W. McColl.	6	do	do
Port Stanley, Ont.	June 25, 1885	Wm. Berry.	6	do	do
Sable Island, N.S.	1885	Supt. Humane Establishment.	From staff of Humane Establishment.	Paid as superintendent and staff of Humane Establishment.	
Scatterie, N.S.	1885	Jas. N. Brown.	6	\$75 per annum, and \$1.50 for each drill.	\$1.50 each drill, twice a month.
	Reorganized in 1890.				
Seal Island, N.S.	1880	Light-keeper.	No organized crew.		
St. Paul's Island, N.S.		Supt. Humane Establishment.	do		
Tormentine, Cape.					
Toronto, Ont.	Mar. 1, 1883	W. Ward.	6	\$75 per annum, and \$1.50 for each drill.	\$1.50 each drill, twice a month.
Wellington, Ont.	Mar. 17, 1883	H. McCullough.	6	do	do
Whitehead, N.S.	June 6, 1890	H. P. Munroe.	6	do	do
Yarmouth, N.S.	1886	R. Carroll.	6	do	do
	Reorganized in 1889.				

No. II.

maintained by the Dominion Government in Canada.

Value of Boat.	Description of Boat.	Equipment.	Where built.	Expenditure for Fiscal Year ended 30th June, 1893.
\$				
575	Self-righting and self-bailing, 25 feet over all, 8 feet beam, Dobbins' pattern.	Full equipment, as required in regulation boat-house.	Dartmouth, N.S.	
	Metallic life-boat, 16 feet keel, 5 feet beam.	Ordinary outfit.		
575	Self-righting and self-bailing, 25 feet over all, 8 feet beam, Dobbins' pattern.	Full equipment, as required in regulation boat-house.	Goderich, Ont.	
575	do	do	do	
575	do	do	Dartmouth, N.S.	
575	do	do	do	
575	do	do	Goderich, Ont.	
	Metallic life-boat, 28 feet keel, 6 feet beam.	Full equipment.	New York.	
	Fishing boats and dorys (not Government property).			
575	Self-righting and self-bailing, 25 feet over all, 7 feet beam, Dobbins' pattern.	Full equipment, as required in regulation boat-house.	Goderich, Ont.	
575	do	do	Dartmouth, N.S.	
550	Self-righting and self-bailing, 26 feet over all, 7 feet beam, Dobbins' pattern.	do	Buffalo, U.S.	
620	do	do	Goderich, Ont.	
575	do	do	Dartmouth, N.S.	
	Surf boat, 26 feet long, 6½ feet beam.	Full equipment and boat-house.	Buffalo, U.S.	
575	Self-righting and self-bailing, 25 feet over all, 7 feet beam.	do	Goderich, Ont.	
	Two boats as described above, Dobbins' pattern; one ordinary life-boat fitted with air-tight compartments; one metallic life-boat; one surf boat; and one large despatch boat, schooner rigged, equipped for sea-going.	Boat-houses, full equipments, &c.		
	Self-righting, &c., same as others, Dobbins' pattern, and clinker-built ships' life-boat, 21 feet keel.	Full equipment and boat-house.	Dartmouth, N.S.	
	Wooden life-boat, 25 feet long, 6 feet beam, fitted with air-tight compartments.	do	Halifax, N.S.	
	Two surf boats, one 25 feet over all, 6½ feet beam, the other 23 feet long, 4 feet 8 inches beam.		do	
575	Self-righting, &c., same as others, Dobbins' pattern.	Not yet equipped.		
		Full equipment and boat-house.	Goderich, Ont.	
1,400	do	do	Buffalo, U.S.	
575	do	do	Dartmouth, N.S.	
575	do	do	do	

REPORT OF ALFRED OGDEN AS TO EFFICIENCY OF LIFE STATIONS, BOATS AND CREWS.

PICTOU, N.S., 25th September, 1893.

WILLIAM SMITH, Esq.,
Deputy Minister of Marine and Fisheries,
Ottawa.

SIR,—In compliance with the instructions contained in your letter of the 31st August, 1892 (Ref. 9, 535, '92), I beg to report that with the exception of the Island of St. Paul, I have visited all the life-saving stations in the provinces of New Brunswick and Nova Scotia, and append herewith a statement of the efficiency and requirements of the same.

PICTOU ISLAND STATION

Visited and inspected 3rd July last. Found that the hinges of the scuppers in the life boat were rusted out. It is necessary that these should be replaced; otherwise the boat was in good condition.

The boat-house and appliances were found in good order, excepting an addition to the launch-ways is necessary, requiring 209 feet of 12 x 2 inch spruce plank and some spikes. Estimated cost, \$6.00.

The winch is somewhat out of repair; cost of renewing, probably \$5.00; a new lantern is also needed, cost \$1.00. Total, \$12.

The land upon which the boat-house stands is not the property of the department, but is owned by J. W. Hogg. It is suggested that the department should have a deed of the property.

The crew were active, able-bodied, and good oarsmen; well drilled and disciplined.

Upon my arrival I notified the coxswain that I wished to inspect the boat and crew, and within thirty minutes they were all present and the boat launched.

SABLE ISLAND STATIONS.

These are under the direction of the superintendent of the humane institution on the island.

On the 11th August I arrived here in the Government steamer "Newfield," and examined all boats and appliances; found everything in good order and condition, except at No. 3 station, where the coxswain reported the old life-jackets unsound. Upon examination I concur, and recommend that seven new jackets be obtained.

The Superintendent, Mr. Boutilier, urges that a mortar and rocket apparatus be supplied for No. 4 station, east end, and I am of the opinion that this request should be granted.

During my last visit on the island the men were all engaged in shipping horses upon the "Newfield, so that I had no opportunity of exercising the crews, but they are all active and able-bodied men.

DEVIL'S ISLAND STATION

Visited 15th August; found boat, boat-house and appliances in good order. Some new lines will be required at this station, viz., 10 fathoms 3-inch manilla rope for cradle, 30 fathoms 1½-inch life line.

The crew were all present. Found them to be active and able-bodied men, and upon exercising them, found them to be excellent oarsmen.

DUNCAN'S COVE STATION.

Visited 17th August. Boat-house, boat and appliances were found to be in good order and well cared for.

At the time of my visit part of the crew were temporarily absent in Halifax City, and as the tide was low, involving considerable labour to place the launch-ways, I did not require the coxswain to launch the boat.

The crew are all boat fishermen and live near the station.

HERRING COVE STATION

Visited 17th August. Found the boat in good order, but the appliances were not in proper position.

The coxswain is a new man, and did not seem to understand the requirements of the regulations. I gave such instructions in the case as were necessary.

I exercised the crew, who were active, able-bodied men and excellent oarsmen.

WHITE HEAD STATION

Visited 25th August. Found boat-house, boat and all appliances in good order, except the scupper hinges, four of which are rusted out and will require replacing.

The crew exercised for one hour. They are active, able-bodied men and first-class oarsmen.

SCATTABIE ISLAND STATION

Visited 1st September. At this station, boat-house, boat and all appliances are in good order, except the cradle, which is too short for the boat, and a new one is required. One axe and paint and oil for boat is also needed. I had to visit the island in an open boat, and as the wind was blowing hard from the north-west and I was anxious to reach the main land before dark, I did not exercise the crew, but they are fishermen and had the appearance of being well able to handle the boat in any weather.

CAPE TORMENTINE, N. B., STATION

Visited 8th September. As yet no organized crew at this station.

MUD ISLAND STATION

Visited 13th September. This station has one dory 18 feet long, with air-tight compartments forward and aft, and one keel boat 22 feet long, sloop-rigged (new), the property of the Mud Island Lobster Company, who receives from the department some compensation for keeping these boats in readiness for an emergency.

During the winter months three men employed by this company live on the island.

During the summer season a large number of fishermen are on the island.

YARMOUTH STATION, BAKER'S COVE

Visited 14th September. The boat at this station reported to have come from Sable Island in 1887, is very much out of repair and unfit for use.

SEAL ISLAND STATION

Visited 13th September. The boat at this station is heavy and hard to row; the thwarts are not properly arranged, but it is a good sea and surf boat.

From 1st November to 15th March three men only reside upon the island.

A loaded cane and light heaving line, and two iron water buckets, are required.

The boat and equipments were in good order.

CAPE SABLE STATION

Visited 15th September. At this station there is a metallic life-boat 16 feet long which is not suitable for the place.

I would recommend a larger boat with full equipment. A volunteer crew can be obtained, at one hour's notice, from Cape Sable Island.

BLANCHE POINT STATION

Visited 16th September. Found boat-house and boat in good condition. Exercised the crew, who are active, able-bodied and splendid oarsmen, and under good discipline.

PORT MOUTON ISLAND STATION

Visited 18th September. Coxswain absent on main land. Found boat in good order, except scupper hinges, which are all rusted off.

I saw most of the crew, who are able-bodied fishermen; but as the coxswain was absent I did not ask them to launch the boat.

On my way back to the main land I met the coxswain, a fine specimen of a fisherman, who was under the impression that he could use the boat-house for private purposes. I gave him the necessary instructions regarding the boat-house and appliances.

At Shelburn I saw a life-boat (McLellan's model), under construction by J. McGill, Esq. The material used was of good quality and light; the workmanship is also good. This boat, in my opinion, will be more suitable for our coast than those now in use.

I am, sir,

Your obedient servant,

ALFRED OGDEN.

Extract from a paper by Sumner J. Kimball, General Superintendent of the United States' life-saving service.

The ultimate means employed by life-saving institutions to rescue people from stranded vessels are everywhere essentially the same. The tumultuous waters between the wreck and the shore are either crossed by a life-boat sent out to the imperilled people, or are spanned by strong lines by which a breeches-buoy or other vehicle is passed back and forth. There are many kinds of life-boats, however, and various devices for effecting line-communication. The type of boat in most general use in our service, although properly entitled to be called a life-boat, is distinctively known as the surf-boat, and this term will be applied to it in the remarks which follow upon this topic. There are several varieties of this type, all developments of the boat found in use among the shore fishermen or surfmen of the Long Island and New Jersey coasts for crossing the surf on the outlying sand-bars in their daily blue-fishing when the first boat-houses or stations were placed there. Three varieties, respectively designated the Beebe, the Higgins & Gifford, and the Beebe-McLellan surf-boat, from the names of the persons who devised the modifications which characterize them, are the only ones furnished to the stations in recent years. They are all constructed of white cedar with white oak frames, and their dimensions are from 25 to 27 feet in length, $6\frac{1}{2}$ to 7 feet beam, 2 feet 3 inches to 2 feet 6 inches depth amidships, and 1 foot 7 inches to 2 feet 1 inch sheer of gunwale. Their bottoms are flat, with little or no keel, and have a camper of $1\frac{1}{2}$ or 2 inches in 8 feet each side of the midship section. They draw 6 or 7 inches of water, light, and weigh from 700 to 1,100 pounds. They are propelled with six oars, without sails, and are expected to carry, besides their crews, from ten to twelve persons, although as many as fifteen

have been landed at a time in a bad sea. Their cost ranges from \$210 to \$275. There is no difference between the Beebe and the Higgins & Gifford boat, except that the former has more sheer and is a clinker-built, while the latter is of carvel construction. The Beebe-McLellan boat is the Beebe boat with the self-bailing quality incorporated. This feature has been added within the past two years, and but few of them have yet been put into service. All of these boats are so light as to be readily transported along the shore; they can be launched in very shallow water, and in the dexterous hands of our surfmen are manœuvred in the breakers with marvellous ease and celerity. This facility of handling is of great advantage when working wreckage, and to quickly slip up alongside a stranded vessel at a favourable moment and receive its freight, while it is easily fended off from contact with the lurching hull.

These boats, of one variety or other, are supplied to nearly all the stations in the service, and on the Atlantic sea-board they are relied upon almost exclusively. Indeed, the shores of soft, yielding sand without roads, and the flat beaches covered with but little depth of water for a considerable distance seaward, which almost uniformly mark the coast from Cape Cod to Cape Fear, preclude the use of boats of greater weight and draught. Even at those stations where the most approved self-righting and self-bailing boats are furnished, the surf-boats are generally preferred by the life-saving crews for short distances and when the number of imperilled people is not large. In executing the work required at minor casualties, such as aiding to float stranded craft by carrying out anchors, running lines to tugs, etc., they are especially handy and by their use a vast amount of property has been saved.

As respects safety they will compare favourably with any other boats. During the eighteen years they have been in the hands of our crews they have been launched 6,730 times in actual service, and have landed 6,735 persons from wrecked vessels. In all this service they have capsized but 14 times. Six of these instances were attended with loss of life, the number of persons perishing being 41, of whom 27 belonged to the service and 14 were shipwrecked people.

Among other life-boats, the self-righting and self-bailing boats of the Royal National Life Boat Institution of Great Britain, the honoured mother and mentor of all existing life-saving organizations, are unquestionably pre-eminent. They are the product of a century's devoted study and experiment with unstinted means, dating from the time the London coach-maker first conceived the idea of a life-boat. Their wonderful achievements have formed the theme of song and story, shed merited luster upon the institution which fostered their development, and stimulated the formation of kindred organizations equipped with their models throughout christendom. I learn from the annual reports of the institution that during the same period of eighteen years her boats have capsized 21 times attended by loss of life, the number perishing aggregating 75, of whom 68 were life-boatmen and 7 shipwrecked people. The number of capsizes unattended with loss of life I could not ascertain, except by an exhaustive search through the detailed accounts of all occasions of service, but I find by the official report of the inquiry into the circumstances of the accidents to the Southport and St. Anne's life-boats in December, 1886, made to the Board of Trade by Sir Digby Murray, Bart., and Captain the Hon. H. W. Chetwynd, of the Royal Navy, chief inspector of life-boats for the institution, that during the previous thirty-two years, the self-righting boats of the institution had been launched in actual service 5,000 times, whereby 12,000 lives were saved, and that on these occasions 41 of the boats had capsized, 23 of the accidents being unattended with loss of life, while 18 were accompanied with fatal results. The number of persons lost was 88, 76 being life-boatmen and 12 shipwrecked people. The report further states that "the 76 life-boatmen lost represented about 1 in 850 of the men afloat in the life-boats on service, and the capsizes 1 out of each 120 launches on service." In the case of our capsized surf-boats the 27 men lost represented 1 in 1,744 of the men afloat in the surf-boats on the service, and the capsizes 1 out of each 480 launches on service. But as the saving of property is an incidental duty imposed upon our crews, the surf-boats, although they are not used in saving cargoes, are doubtless often launched under conditions more favourable than gen-

erally fall to the lot of the boats of the institution, and therefore the number of launches does not afford a satisfactory basis for comparison. Let us therefore take another basis. The number of lives saved by the life-boats is stated, as we have seen, at 12,000—in round numbers, probably. Calling the number saved by the surf-boats 6,500 in round numbers, we find, then, 1 capsizes of the surf-boat to every 464 persons saved, a difference in its favour of 172. The self-righting boat lost 1 life to every 136 saved, the surf-boat 1 to every 158 saved, a difference of 22 in its favour. Of the life-boatmen afloat, 1 to 850 were lost by the self-righting boat, 1 to 1,109 by the surf-boat, a difference of 259 in favour of the latter. In the life-boat 1 man of the crew is lost for every 157 lives saved, in the surf-boat 1 for every 240 saved, a difference in favour of the surf-boat of 83.

Since 1876 there have been put into the United States Service 37 self-righting and self-bailing life-boats of the model of a boat received from the Royal National Life-boat Institution. They are all nearly reproductions of the boat sent to us. They are 29 feet 3 inches in length, 7 feet 7 inches beam, 3 feet 1½ inches deep amidships, 1 foot 10 inches sheer of gunwale, straight-bottomed, pull 8 oars, and weigh about 4,000 pounds each. This great weight is made necessary by the device of a heavy iron keel to aid in securing the self-righting quality. They have made on service 471 trips and saved 584 persons; they have capsized on service 4 times, once with fatal results, 5 lives, all shipwrecked people being lost. These figures produce results similar to those already reached in reference to the life-boats used in Great Britain. The boats have capsized once in each 118 trips, and once in rescuing every 146 persons, and one life has been lost from the boats to every 117 saved.

There are two other varieties of self-righting and self-bailing boats in the service—the Richardson and the Dobbins. They are modifications of the life-boat just described, though considerably lighter. They have not been used often enough to furnish any practical basis of comparison, but have given good results so far.

Notwithstanding these figures it would be unwise to hastily conclude that the surf-boat of either variety mentioned is the best life-boat for all conditions of service. Among the boats at present employed in life-saving institutions I know of none that can justly be denominated the best life-boat. The type that is best for one locality may be ill-adapted or entirely unfitted for another, and a boat that would be serviceable at one time might be worse than useless at another in the same locality.

On the larger portion of the Atlantic seaboard boat service at wrecks is not very distant from the shore, and the chief danger lurks in the line of surf which must be crossed and in the breakers on outlying shoals. For this service the surf-boat is easily transported on its carriage through the loose and trackless sands of the strand to a point as near the wreck as possible, is quickly unloaded, and at a favourable time is launched in a minute. The keeper steers with a long steering oar, and with the aid of his trained surfmen, intent upon his every look and command, manœuvres his buoyant craft through the surf with masterly skill. He is usually able to avoid a direct encounter with the heaviest breakers, but if he is obliged to receive their onset meets them directly "head on." His practised hand immediately perceives any excess of weight thrown against either bow and instantly counteracts its force with his oar as instinctively and unerringly as the skilled musician presses the proper key of his instrument. He thus keeps his boat from breaching-to and avoids a threatened capsize. The self-righting boat is more unwieldy and not so quickly responsive to the coxswain's tactics, and is therefore not so well adapted to our general work.

The usual conditions of service in the United Kingdom are probably different. The excursions the life-boats make on service are said to be more extended, and exposure to violent gales for long periods upon the open sea more frequent. Our surf-boats, it is true, venture upon outlying shoals covered with breakers, such as the Nantucket Shoals, off Massachusetts, and the Diamond Shoals, off Cape Hatteras, but it is likely that there is no such locality within the scope of our service so fatal as the terrible Goodwin Sands, which are often visited by the boats of the Royal National Life-boat Institution, and where they have accomplished so much noble work. There are doubtless other important differences in the requirements of ser-

vice with which I am not acquainted. Probably, therefore, the conditions are so diverse that no just conclusion as to the superiority of the two boats can be drawn from the results of their experience, and I have given these results in comparison, not with a desire to establish such a conclusion, but to show that the United States service has provided quite as effective means for dealing with the conditions presented to it as the most eminent organization of other countries has for its conditions, and because I thought they might be of service in the deliberations of the committee in considering some of the topics of the division of the programme referred to it, and, further, because I thought they might aid in the efforts always being made by life-saving institutions and by individuals to improve the safety of life-saving boats. Where long excursions are to be undertaken and the service is exceptionally hazardous, the men undoubtedly feel safer in a self-righting boat, and, having this in view, it has been introduced into many of our stations, where it may be found side by side with the surf-boat, the choice being left to the keepers to take either, as the occasion seems in their experienced judgment to demand.

Self-righting and self-bailing are properties unquestionably desirable in any boat designed to be used in saving life, provided they can be obtained without too greatly impairing other necessary qualities. May it not be a question worthy of consideration whether these properties and the means of propulsion by sails cannot be advantageously incorporated into the surf-boat without materially increasing its weight and draught, and whether such a boat would not be found to be better adapted to perform the general services of life-boats than those which sit deeply in the water, and which, on that account and because of their great weight, are less agile in action and more difficult to transport and launch? Already, as I have said, the self-bailing property has been successfully applied by Lieut. McLellan, and is hailed with delight by our crews; the addition of sails has also been accomplished by the use of a centre board, and I am able to add that I believe the self-righting quality is on the verge of successful application. One boat of this kind is already built, and with slight changes, which seem entirely practicable, I believe will satisfactorily solve the problem, at least so far as to answer all the purposes of our service. When this result is attained, why may not self-bailing and self-righting boats supplant the inferior boats now carried upon passenger vessels for life-boats? And why, since it has been found that the self-bailing principle can be applied to a model thoroughly convenient to be carried on shipboard, may not these vessels even now be supplied with self-bailing boats, in which the liability to capsizes is greatly diminished by reason of their ability to immediately free themselves of any water they may ship?

APPENDIX No. 12.

LIST OF STATUTES RELATING TO DEPARTMENT OF MARINE AND FISHERIES PASSED AT THE SESSION OF 1893.

CHAP. 22.

An Act to amend the Merchant Shipping Act, with respect to load lines.

[Assented to 1st April, 1893.]

Whereas by section five hundred and forty-seven of the Act of the Parliament of the United Kingdom known as The Merchant Shipping Act, 1854, it is enacted that the legislative authority of any British possession shall have power by any Act or ordinance confirmed by Her Majesty in Council to repeal, wholly or in part, any provisions of the said Act relating to ships registered in such possession; and whereas by the Act of the said Parliament known as The Merchant Shipping Act, 1876,—which, as is provided by section two thereof, is to be construed as one with The Merchant Shipping Act, 1854, and the Acts amending the same,—certain provisions are made in sections twenty-six, twenty-seven and twenty-eight thereof, with respect to the marking of load lines upon British ships; and whereas by sections one and two of the Act of the said Parliament known as The Merchant Shipping Act, 1890, the provisions of the said sections twenty-six and twenty-seven are amended in certain particulars; and whereas it is not desirable that the said sections twenty-six and twenty-seven, as so amended, or the regulations which have been or may be made by the Board of Trade thereunder, or the provisions of the said section twenty-eight, should apply to ships registered in Canada: Therefore Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, declares and enacts as follows:—

1. Sections twenty-six, twenty-seven and twenty-eight of The Merchant Shipping Act, 1876, and sections one and two of The Merchant Shipping Act, 1890, of the United Kingdom, are hereby repealed so far as they relate to or affect ships registered in Canada.

2. This Act shall not come into force until Her Majesty's pleasure thereon has been signified by proclamation in the *Canada Gazette*, nor until a proclamation of the Governor in Council bringing it into affect has also been published in the said *Gazette*.

CHAP. 21.

An Act respecting the Harbour Commissioners of Montreal.

[Assented to 1st April, 1893.]

Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, declares and enacts as follows:—

1. For the removal of doubts as to the borrowing powers of the Harbour Commissioners of Montreal, it is hereby declared and enacted that it was and is lawful for the said Harbour Commissioners to borrow, subject to the provisions of the Acts relating to the said Harbour Commissioners with respect to moneys thereby authorized to be borrowed by them, such sums of money as are necessary for the purpose of redeeming debentures issued by them for moneys borrowed under the said Acts: Provided, that the sums so borrowed shall not in any case exceed the amount of the debentures to be redeemed, and shall not be applied to any other purpose.

2. Section eight of chapter sixty-one of the Statutes of 1873, and section two of chapter thirty-one of the Statutes of 1874, as amended by section four of chapter fifty-three of the Statutes of 1891, are hereby repealed, and in lieu thereof it is hereby enacted that the Corporation of the Harbour Commissioners of Montreal shall

consist of eleven members, six of whom shall be appointed by the Governor in Council, one of whom shall be the mayor of Montreal, *ex officio*, during his term of office, and the remaining four of whom shall be elected—one by each of the following bodies:—The Montreal Board of Trade, the Montreal Corn Exchange Association, *la Chambre de Commerce du district de Montréal*, and the shipping interest of the harbour of Montreal.

2. The rotation shall continue to be every four years.

3. Section ten of chapter sixty-one of the Statutes of 1873, as amended by section one of chapter thirty-one of the Statutes of 1874, is hereby repealed and the following substituted therefor:—

“10. The Board of Trade, the Corn Exchange Association, and *la Chambre de Commerce du district de Montréal* shall severally, at a meeting to be held at their respective chambers or usual places of meeting, in the city of Montreal, at noon, on the first Monday of August (or if that day should be a legal holiday, then the next day not being such holiday) in each year, elect each one person to fill the office of harbour commissioner; and the person having the majority of votes of those personally present at each of the said several meetings, shall be held to be duly elected, and the secretary shall give him a certificate of his election, and shall also certify the same to the Minister of Marine and Fisheries.”

CHAP. 24.

An Act to amend the Inland Waters Seamen's Act.

[Assented to 1st April, 1893.]

Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. The Inland Waters Seamen's Act, chapter 75 of the Revised Statutes, is hereby amended by adding the following section thereto immediately after section 35:—

“35a. The master of any ship subject to the provisions of this Act shall, so far as the case permits, have the same rights, liens and remedies for the recovery of his wages, and for the recovery of disbursements properly made by him on account of the ship, and for liabilities properly incurred by him on account of the ship, as by this Act or by any law or custom any seaman, not being a master, has for the recovery of his wages; and if, in any proceeding in any court possessing admiralty jurisdiction in any of the said provinces touching the claim of a master to wages, any right of set-off or counter-claim is set up, such court may enter into and adjudicate upon all questions and settle all accounts then arising or outstanding and unsettled between the parties to the proceeding, and may direct payment of any balance which is found to be due.”

CHAP. 23.

An Act to amend the Wrecks and Salvage Act.

[Assented to 1st April, 1893.]

Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. Sections 7 and 8 of the Wrecks and Salvage Act, chap. 81 of the Revised Statutes, are hereby repealed, and the following substituted therefor:—

“7. Upon the conclusion of any such inquiry the officer or person who made it shall send to the Minister a report containing a full statement of the case, and of his opinion thereon, accompanied by such report of or extracts from the evidence and such observations as he thinks fit.”

“8. If it appears to the Minister in any such case as aforesaid, either upon or without any such preliminary inquiry as aforesaid, or in any case of a charge of

misconduct or incapacity brought by any person against any master or mate of any ship, that a formal investigation is requisite or expedient, the Minister may appoint any officer or officers of the Government of Canada or any body corporate, commissioner or commissioners, constituted for any public purpose subject to the legislative authority of the Parliament of Canada, by his, its or their name or names or title or titles of office, or any other competent person or persons, to be a court or tribunal for the purpose of such investigation."

CHAP. 25.

An Act further to amend the Steamboat Inspection Act.

[Assented to 1st April, 1893.]

Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. Section 43 of The Steamboat Inspection Act, chapter 78 of the Revised Statutes, is hereby repealed and the following substituted therefor:—

"43. No person shall employ another as engineer, and no person shall serve as engineer on any passenger steamboat, of whatever tonnage, or on any freight steamboat of over 150 tons gross, unless the person employed or serving as engineer holds a certificate from the Minister for the grade in which he is to be employed, and every person who offends against this section shall incur a penalty of \$100, provided however, that if a steamboat leaves a port with a complement of engineers, and on her voyage is deprived of their services, or the services of any of them, without the consent, fault or collusion of the master, owner or any one interested in the steamboat, the deficiency may be temporarily supplied until engineers holding such certificates can be obtained."

2. Subsection 1 of section 61 of the said Act, as amended by section 5 of chapter 23 of the Statutes of 1889, is hereby repealed and the following substituted therefor:—

"61. All penalties incurred under this Act may, when no other provision is made in the case, be recovered with costs in a summary manner under the Act respecting Summary Proceedings before Justices of the Peace, in the name of Her Majesty, by any inspector or any person aggrieved by any act, neglect or omission, on the evidence of one credible witness who may be the prosecuting inspector himself, before any judge of a county court, judge of the sessions of the peace, stipendiary or police magistrate, or two justices of the peace; and in default of immediate payment of such penalty, such judge, magistrate or justices may commit the offender to jail for any term not exceeding three months, unless such penalty is sooner paid; and all penalties recovered under this Act shall be paid to the Minister of Finance and Receiver General, and shall be by him placed to the credit of the Consolidated Revenue Fund of Canada; provided, that the Governor in Council may, if he sees fit, authorize the payment of a portion of any such penalty to the informer, if he is not an inspector."

CHAP. 20.

An Act to amend the Act respecting the Harbour and River Police of the Province of Quebec.

[Assented to 1st April, 1893.]

Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. Chapter 89 of the Revised Statutes, intituled "An Act respecting the Harbour and River Police of the Province of Quebec, is hereby amended by adding the following section thereto:—

"11. The tonnage duty payable under this Act shall no longer be levied when the harbour and river police force mentioned in section 2 ceases to be maintained under the authority of this Act."

APPENDIX No. 13.

COMPARATIVE STATEMENT of Lighthouses, &c., and Steamers of the Marine Branch maintained in the respective Agencies, corrected up to 31st December, 1893.

District.	Light stations.	Lights.	Keepers.	Light-ships.	Fog-whistles.	Fog-horns.	Fog-bells.	Fog-guns or bombs.	Whistling buoys.	Bell-buoys.	Gas buoys.	Steamers.	Total expenditure for each Agency.	Salaries paid in the Agencies.	Number of Persons employed in each Agency.
Province of Ontario	173	*	167	4	2	10	2			2			\$ cts.		
Light-ships	4	212	4										96,364 77		
Province of Quebec	115	152	136	8	2	8		9			10 (4 with bells)	3	157,166 13	4,590	5—Agent, accountant and 3 clerks.
Light-ships	8	8			3		1								
Province of Nova Scotia	169	175	174	1	10	6	2	1	15	10		1	192,290 14	5,200	5—Agent, inspector, accountant, clerk, messenger.
Fog-alarms	2	2													
Light-ships	1	1													
Province of New Brunswick	94	118	100	1	4	8		1	4	3		1	99,931 34	3,400	3—Agent, accountant, messenger.
Fog-alarms	3	3													
Light-ships	1	1													
Province of Prince Edward Island	34	52	40			1			2	1		S.S. "Stanley."	39,480 44	1,825	1—Agent, warehouseman.
Province of British Columbia	13	13	15		1	4	3		1	1			55,965 79	1,975	2—Agent, messenger, and occasional clerical assistance.
Lighted buoys	2	4													
	619	745	632	14	22	37	8	11	21	17	10				

* Light-ships and fog-alarms where there are no lights are in these two columns included in the total number of light stations and lights in the Dominion.

APPENDIX No. 14.

LIST of Persons to whom Rewards have been granted by the Government of Canada, for the year 1893, for gallant and humane services rendered in saving life from shipwrecked vessels, or by British and Foreign Governments for similar services rendered by Canadian vessels in saving life from shipwrecked British and foreign vessels for same period.

Names and Designations of Persons.	Nature of Services rendered.	Date of Services rendered.	Description of Reward.
Capt. James Campbell, master; Edward H. Stannard, 2nd mate; Chas. Golborne, 3rd mate; W. Stephens, boatswain; W. D. Johnson and John Burns, seamen; of the ss. "Bentala."	Gallant and humane services to the shipwrecked crew of the barque "Howard A. Turner," of St. John, N.B.	Jan. 19, 1890.	A binocular glass to the master, value £5; a gold watch to 2nd mate, value £15; a gold watch to 3rd mate, value £0; a silver watch to boatswain, value \$25; and a silver watch to each of the 2 seamen, value \$25 each.
Dennis Laurie and Peter Whalen, of North Sydney, N.S.	Humane services in rescue of three fishermen from drowning.	July 23, 1891.	Honorary testimonials on vellum from the Royal Humane Society of London, Eng.
Fishermen at St. Pierre Mi-quelon.	Services in saving seven of the crew of steamer "William," of Charlottetown, P. E. I., wrecked off St. Pierre Mi-quelon.	Dec. 28, 1891.	\$3 to each of the 15 fishermen—\$45 in all.
Capt. F. Carey, master; G. C. Evans, 1st officer; R. Roberts, 4th officer; J. Squires, carpenter; J. Cosgrave, boatswain; G. Moore, M. Horan and J. Ronayne, quartermasters of the ss. "Lake Huron," of the Beaver line of steamers.	Gallant exertions in rescue of the shipwrecked crew of the barque "Kate Cann," of Yarmouth, N.S.	Jan. 4, 1892.	A binocular glass to master, value \$30; a gold watch to 1st officer, value \$80; a silver watch to 4th officer, value \$50; a silver watch to carpenter, value \$30; a silver watch to boatswain, value \$26; a silver watch to each of the three other men, value \$20 each.
Capt. F. W. Gormley, master of the "Severn," of Windsor, N.S.	Assistance to schr. "Pollux," of Hamburg, while in distress at sea.	Jan. —, 1892.	A gold watch awarded by the Emperor of Germany.
Mr. John Boulton, of Niagara-on-the-Lake, Ont.	Rescue of nine persons from drowning at Niagara-on-the-Lake, Ont.	May 24, 1892.	Honorary testimonial on vellum from the Royal Humane Society.
David McKenzie and James McKenzie, of Big Bras d'Or, Cape Breton, N.S.	Meritorious conduct of the two lads, aged respectively 15 and 12, in rescuing a fisherman from drowning, whose boat had capsized and whose companion got drowned on the Big Bras d'Or Lake, N.S.	June 27, 1892.	Testimonials on vellum from the Royal Humane Society of London, Eng.
Capt. John Bochner, master of the schooner "Florence," of Lunenburg, N.S.	Rescue of Capt. Budd S. Melvin, the only survivor from the wrecked schr. "Theresa" of New York, U.S.	July 4, 1892.	A gold watch and chain from the United States Government.
Mr. Charles Rafuse, master of the fishing schooner "Amelia Cockburn," of Lunenburg, N.S.	Kindness and humanity to the three survivors of the crew of the barque "Hope," of Aberystwith, which foundered in the North Atlantic.	Aug. 22, 1892.	A binocular glass from the Imperial Government.
Capt. L. Spafford, coxswain, and crew of life-boat at Poplar Point, Ont.	Services to schr. "Grantham," stranded on Timber Island Bar.	Oct. 9, 1892.	\$1.50 to each of the seven men of the life-boat crew—\$10.50 in all.

LIST of persons to whom Rewards have been granted, &c.—*Continued.*

Names and Designations of Persons.	Nature of Service rendered.	Date of Service rendered.	Description of Reward.
Capt. C. R. Briggs, master; G. W. Marshall, 1st officer; T. Gale, boatswain; G. Vringer and A. Von Herman, seamen; of the ss. "Kasbek," of London, England.	Rescue of the shipwrecked crew of the brigantine "American Union," of Halifax, N.S., abandoned at sea.	Oct. 18, 1892.	A binocular glass to master, value £5; a binocular glass to 1st officer, value £5; and £2 to boatswain and to each of the seamen.
Capt. John Hayes, of pilot-boat No. 4, of Halifax, N.S.	Services in rescuing the shipwrecked crew of the American schr. "Knight Templar."	Nov. 12, 1892.	A marine glass by the United States Government.
Captain Auguste A. Goudillon, master; S. F. Fournier, 2nd officer; Antoine Revest, quarter master; Yves M. Legrand, Joseph M. Legrand and Pierre M. Allaire, seamen of the French steamer "Marseilles."	Humane and generous services to the survivors of the crew of the barque "Navarch" of Yarmouth, N.S., abandoned off the Island of Flores, Azores group, Atlantic Ocean.	Dec. 20, 1892.	A binocular glass to master, value £6; a gold watch to 2nd officer, value \$102; a silver watch to quarter master, \$27; and a silver watch to each of the three seamen, of the value of \$20.
Mr. E. F. Amesbury, master of the ship "S. D. Carlton" of Rockport, Maine, U.S.	Services in rescue at sea of the crew of the schooner "Mineola" of Windsor, N.S.	Jan. 5, 1893.	Letter of thanks from the Government of Canada.
Captain Wm. Sampson, master; O. B. Thompson, 2nd officer; Hans Hansen, C. Dobbela, K. Karbore and W. T. Nylund, seamen of the British ss. "Sandfield."	Rescue under great difficulties of the master and three men of the schooner "Unexpected" of Windsor, N.S.	Jan. 26, 1893.	A binocular glass to master, value £5; a silver watch to 2nd officer, value £9; and £2 to each of the four seamen.
Mr. Daniel McDonald, master; John J. Carroll and Henry Scott of the schooner "Hustler" of Gloucester, Mass.	Humane and gallant exertions in the rescue of the shipwrecked crew of the schooner "Ann Maria" in distress near Cross Island.	Feb. 4, 1893.	A binocular glass to master, value £4 sterling; a silver watch to each of the men of the value of £6 sterling each.
Simeon Hiltz, James Meisner, Michael Stoddard, Edmund Conrod, Elias Hiltz, James Conrod, Thomas Conrod, Henry Nangle, William Conrod, Charles P. Conrod, Alex. Conrod, Thomas Nangle, Henry Merson, William Nangle, fishermen.	Rescue of crew of brigantine "Edith" of Halifax, N.S., which vessel had run ashore in the fog on Egg Island near Halifax, N.S.	Feb. 7, 1893.	\$5 to each of the 14 men who accomplished the rescue.
Timothy Akin, Frederick Akin, Isaiah Tilton, Eugene Brightman and Hiram Jackson of the volunteer lifeboat crew of Cuttyhunk, Mass., U.S.	These five brave men lost their lives in attempting the rescue of the brigantine "Aquatic" of St. John, N.B., ashore on the rocks near Cuttyhunk, Mass.	Feb. 24, 1893.	A cheque of \$1,000 sent to Humane Society of Massachusetts at Boston, for distribution to the families of the deceased, with an expression of the sympathy of the Government of Canada to the families in the loss sustained.
Captain B. Wischhausen, master; H. Dalldorf, 1st officer; E. Schmidt, W. Stuntz, John Frederickson and Albert Koing, seamen of the ss. "Gut Heil" of Bremerhaven.	Humane and gallant exertions in the rescue of the shipwrecked crew of the schooner "Annie" of Halifax, N.S.	Feb. 25, 1893.	A binocular glass to master, value £5; a gold watch to 1st officer, value \$80; and a silver watch to each of the four seamen, value \$20 each.
Mr. C. A. Martel, master; F. Martell, mate; P. Campbell and V. Power, seamen of the schooner "Helena" of Halifax, N.S.	Services in the rescue of the shipwrecked crew of the American barkentine "Edward Cushing."	Mar. 11, 1893.	A gold watch and chain to master; a gold medal to mate, and a silver medal to each of the two seamen from the United States Government.
Men of lifeboat station at Rockport, Mass., U.S.	Gallant and humane conduct in effecting the rescue of the shipwrecked schooner "Osse" of St. John, N.B.	May 17, 1893.	\$100 to be distributed among 13 men of the lifeboat crew.

LIST of Persons to whom Rewards have been granted, &c.—*Concluded.*

Names and Designation of Persons.	Nature of Services rendered.	Date of Services rendered.	Description of Reward.
Captain Wm. Ward, coxswain, and crew of lifeboat station at Toronto, Ont.	Courage and humanity in rescuing two men from drowning at Toronto Island.	May 18, 1893.	Honorary testimonial on vellum from the Royal Humane Society of London, England.
Mr. Samuel Ellery of Penetanguishene, Ont.	Rescue of Walter Charlebois from drowning at Penetanguishene.	June 18, 1893.	Honorary testimonial on vellum from the Royal Humane Society of London, England.
Captain Williams, master; S. S. Connauton, chief officer; John Corbett, boatswain; George Nugent, John Sloan and Stephen Polglase, seamen of the Royal Mail Steamship "Vancouver" of the Dominion Line of steamers.	Rescue from drowning in the River St. Lawrence near L'Islet, of two persons who had been fishing, and whose boat was overturned in a squall.	Sept. — 1893.	The thanks of the Government of Canada.
Captain D. Rooney, coxswain, and crew of the life-boat at Cobourg, Ont.	Gallant conduct in rescuing the schooner "White Oak," when in imminent danger of being driven ashore and wrecked at Boulton Point, Ont.	Sept. 16, 1893	\$5 to each of the seven men of the life-boat crew—\$35 in all.
Donald McLean, coxswain, and crew of life-boat at Pictou Island, N.S.	Rescue of thirteen men of the crew of the Norwegian barque "Stanley," on shoal off west end of Pictou Island, N.S.	do 30, 1893	\$3 to each of the seven men of life-boat crew—\$21 in all. Allowed crew \$70 for wages and expenses incurred, as life-boat and crew had been weather bound 6 days at Pictou, N.S.
Captain A. Henning, coxswain, and crew of life-boat at Pelée Island, Ont.	Life-boat crew stood in readiness all day to go and assist the tug "Louise" in the rescue of the schooner "David Stewart," foundered at Point Pelée, Ont.	Oct. 6, 1893	\$2 to each of the seven men of life-b at crew.
Captain Hugh McCullough, coxswain, and crew of life-boat station at Wellington, Ont., and one other man.	Rescue of the American barge "Hecla."	do 14, 1893	\$6 to each of the nine men of the crew, and \$3 to other man—\$57 in all.
Captain J. W. McCall, coxswain, and crew of life-boat station at Port Rowan, Ont., and two other men.	Services at wreck of American steam barge "Wocoken," which vessel was waterlogged and sank off Clear Creek, 8 miles west of Port Rowan life-saving station.	do 15, 1893	\$5 to each of the six men of crew, and \$3 to each of the two other men.

APPENDIX No. 15.

STATEMENT of Sick Mariners' Dues collected, for the fiscal Year ended 30th June, 1893.

<i>Quebec.</i>		\$ cts.	<i>Nova Scotia—Concluded.</i>		\$ cts.
Gaspé.....		80 65	Canso.....		155 12
Montreal.....		4,582 94	Digby.....		161 88
New Carlisle.....		270 38	Halifax.....		7,015 38
Percé.....		49 44	Kentville.....		72 10
Quebec.....		7,347 02	Liverpool.....		130 54
Rimouski.....		258 22	Lockeport.....		43 08
St. Armand.....		1 88	Lunenburg.....		526 46
St. Johns.....		1,191 59	North Sydney.....		983 94
Sorel.....		113 66	Parasboro.....		805 84
Stanstead.....		22 14	Pictou.....		447 74
Three Rivers.....		210 59	Port Hawkesbury.....		119 81
Total.....		14,128 51	Shelburne.....		182 78
<i>New Brunswick.</i>			Sydney.....		2,480 89
Bathurst.....		170 43	Weymouth.....		233 54
Chatham.....		1,631 70	Windsor.....		745 66
Dalhousie.....		514 40	Yarmouth.....		480 16
Dorchester.....		23 63	Total.....		15,527 93
Moncton.....		897 42	<i>Prince Edward Island.</i>		
Newcastle.....		545 76	Charlottetown.....		406 22
Sackville.....		331 72	Summerside.....		77 72
St. Andrews.....		145 24	Total.....		483 94
St. John.....		4,667 38	<i>British Columbia.</i>		
St. Stephen.....		66 10	Nanaimo.....		3,735 38
Total.....		8,993 78	New Westminster.....		60 10
<i>Nova Scotia.</i>			Vancouver.....		1,231 24
Amherst.....		442 36	Victoria.....		2,103 38
Annapolis.....		211 84	Total.....		7,130 10
Arichat.....		144 73	Grand Total.....		46,264 26
Baddeck.....		128 16			
Barrington.....		11 76			
Bridgetown.....		4 16			

F. GOURDEAU,
Accountant.

WM. SMITH,
Deputy Minister of Marine and Fisheries.



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TWENTY-SEVENTH ANNUAL REPORT

OF THE

DEPARTMENT OF MARINE AND FISHERIES

1894

MARINE

PRINTED BY ORDER OF PARLIAMENT



OTTAWA

PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST
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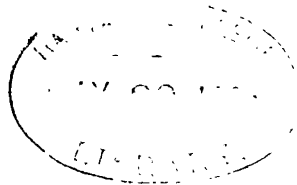
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Can. Dec.

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Don J. J. J. J.

*To His Excellency the Right Honourable SIR JOHN CAMPBELL HAMILTON-GORDON, EARL
OF ABERDEEN, Governor General of Canada, etc., etc.*

MAY IT PLEASE YOUR EXCELLENCY :

I have the honour to submit herewith, for the information of Your Excellency and the Legislature of Canada, the Twenty-seventh Annual Report of the Department of Marine and Fisheries, Marine Branch.

I have the honour to be,

Your Excellency's most obedient servant,

JOHN COSTIGAN,
Minister of Marine and Fisheries.

DEPARTMENT OF MARINE AND FISHERIES,
OTTAWA, 31st December, 1894.

CONTENTS.

	PAGE.
REPORT SUBMITTED BY MINISTER.....	
REPORT OF DEPUTY MINISTER	

SUBJECTS EMBRACED IN DEPUTY MINISTER'S REPORT.

Buoys and Beacons.....	43
Coasting Trade of Canada.....	76
Dominion Steamers	44
Engineers' Certificates.....	71
Georgian Bay and North Channel Survey.....	70
Inside Service Employees.....	73
Lighthouse Service.....	1
do Ontario Division.....	2
do Quebec Division.....	11
do Nova Scotia Division.....	16
do New Brunswick Division.....	30
do Prince Edward Island Division.....	36
do British Columbia Division.....	40
Legislation	77
Longitude of Montreal.....	70
Live Stock Inspection	77
Maintaining Lighthouses and Dominion Steamers	49
Merchant Shipping	57
Masters and Mates' Certificates.....	50
Meteorological Service	76
Magnetic Observatories.....	76
Messenger Pigeons.....	76
Oils for use of Lighthouses.....	43
Outside Service Employees.....	74
Obstructions to Navigation, Removal of.....	77
Sick and Distressed Mariners	54
Steamboat Inspection	71
Wrecks and Casualties	54

APPENDICES.

Expenditure, Statement of.....	79
Hydrographic Work.....	82
Ice Boat Mail Service	185
Live Stock Shipments	141
Life-boat Stations	167
Legislation, Acts Amended	175
Lighthouses, Stations, &c., and Agencies.....	184
Meteorological Service	112
Messenger Pigeon Service	163
Revenue Statement	81
Rewards for Humane Service.....	172
Steamboat Inspection, Report of Chairman.....	133
Signal Service	154
Sick Mariners' Dues.....	174
Wharfs, Statement relating to.....	151

ALPHABETICAL INDEX.

A.

	PAGE.
Aids to Navigation, Ontario	3
do Quebec.....	12
Arichat	19
"Alert".....	45
"Aberdeen".....	47

B.

Britannia	7
Burnt Island.....	8
Burlington Beach.....	8
Barrington Lightship.....	18
Beaver Island.....	19
Black Rock Point.....	20
Buoy Service, Nova Scotia.....	24
Betty's Island.....	21
Battery Point.....	22
Barrington Light-ship	23
Bon Portage.....	23
Bunker Island.....	23
Boar's Head.. ..	23
Buoys, Additional, and changes	25
British Columbia Lighthouse Division.....	40
Beacons and Buoys, British Columbia.....	42
do Dominion of Canada.....	43
"Bayfield".....	48
Board of Steamboat Inspection.....	72

C.

Chantry Island	9
Collingwood	9
Cheticamp.....	18
Country Harbour	19
Crow Harbour.. ..	19
Cape George.....	20
Caribou.....	21
Coffin's Island	22
Carter's Island.....	22
Cape Sable	22
Cape Negro.....	22
Cape St. Mary's.....	23
Certificates to Masters and Mates, Foreign Sea-going	50
Coasting Trade of Canada.....	76

D.

Digby Pier.....	23
Dominion Steamers—	
"Lansdowne".....	44
"Newfield".....	45
"Stanley".....	45

D—Concluded.

Dominion Steamers—Concluded.

	PAGE.
"Alert".....	45
"Druid".....	46
"Dolphin".....	46
"Quadra".....	46
"Aberdeen".....	47
"Bayfield".....	48
"Sir James Douglas".....	48

E.

Egg Island	19
------------------	----

F.

Fog-whistles, Statement of, 1868 to 1894.....	2
Fog-horns do 1877 to 1894	2
False Ducks	8
Fort William	10
Fog-alarms, improvement in explosives.....	13
do Nova Scotia.....	29

G.

Gananoque Narrows.....	7
Goderich	9
Gaspé Harbour.....	14
Gillis Point.....	17
Green Island.....	20
Guyon Island.....	20
Georgian Bay and North Channel Survey	70

H.

Hope Island.....	9
Horseback Shoal.	13
Herring Cove.....	17
Hubbard's Cove.....	21
Hobson's Nose.....	22

I.

Isaac's Harbour.....	19
Ingonish Harbour.....	20
Isle Haute.....	23
Inland and Coasting Certificates	50
Inside Service.....	73

J.

Jack Straw.....	8
Jeddore	19
Jerseyman's Island.....	18

K

Kagawong.....	10
Kingsport.....	23

L

Lighthouse Service.....	1
Light Stations, statement of, from 1868 to 1894	2
Lighthouses do do	2
Lottie Wolf Rock buoy.....	6
Lachine Pier Light.....	6

INDEX.

ix

L—Concluded.

	PAGE.
Lake St. Louis Light-ships.....	6
Lancaster Bar.....	7
Lancaster Pier.....	7
Low Point.....	20
Little Hope.....	22
Life Boat Stations.....	29
"Lansdowne".....	44
Load Lines.....	66
Longitude of Montreal.....	70
Live Stock, Inspection of Shipments.....	77
Legislation.....	77
Lighthouses and Dominion Steamers, cost of maintaining.....	49

M

Mullin's Point.....	18
Meagher's Beach.....	18
Main-à-Dieu.....	20
Margares.....	21
Moer's Island.....	22
Merchant Shipping.....	57
do.....	60
do statement of vessels on registry books, 1894.....	62
*Meteorological Service.....	75
Magnetic Observatories.....	76
Messenger Pigeons.....	76

N

New Aids to Navigation.....	3
Nigger Island Light.....	5
Nova Scotia Lighthouse Divisions.....	16
New Brunswick do.....	30
New Aids to Navigation, Prince Edward Island.....	36
do British Columbia, improvements.....	40
"Newfield".....	45
New Light established.....	17

O

Ontario Lighthouse Division.....	2
Oakville.....	8
Oils for Lighthouses, Dominion.....	43
Outside Service, Marine Branch.....	74
Obstructions to Navigation, removal of.....	77

P

Parry Sound Range Lights, Buoys and Beacons.....	3
Pancake Shoal Bell Buoy.....	5-11
Point Clair.....	7
Presque Isle.....	8
Point Peter.....	8
Port Stanley.....	8
Pope's Harbour.....	19
Petit de Grat.....	20
Port Hood.....	21
Pomquet.....	21
Pictou Island.....	21
Pugwash.....	21
Pictou Bar.....	21
Port Medway.....	22
Page's Island.....	22

P—Concluded.

	PAGE.
Pubnico	23
Point Prim.....	23
Parrsborough.....	23
Prince Edward Island Division.....	36

Q

Quebec Lighthouse Division.....	11
"Quadra".....	46

R

Richard's Landing Wharf Light.....	6
Red Rock.....	10
Repairs to existing stations, Ontario	6
do do Quebec.....	14
do do New Brunswick	30
do do Prince Edward Island.. ..	37
do do Pritish Columbia.....	41
*Receipts and Expenditure statement of.....	72

S

Sault Ste. Marie Wharf Light.....	5
Ship Channel between Quebec and Montreal, buoyage of	13
Saguenay River Lights.....	15
Sand Point	17
Sheet Rock.....	19
Scattarie	20
Sable Island	26
St. Paul's Island.....	28
"Stanley".....	45
"Sir James Douglas".....	48
Sick and Distressed Mariners.....	54
Steamboat Inspection and Certificates to Engineers.....	71

T

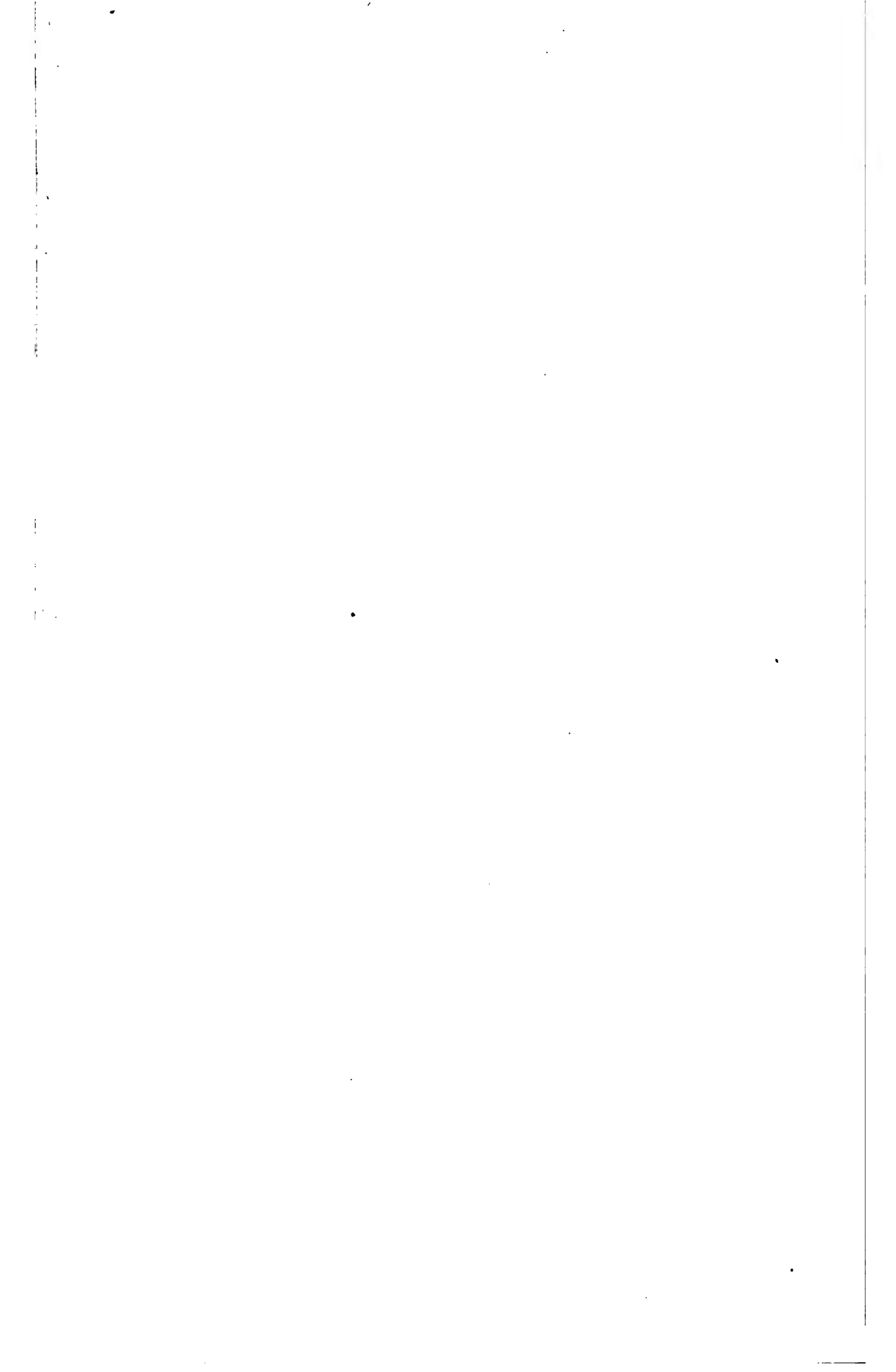
Thames River.	9
Twin Rock Beacon.....	10
Tor Bay.....	19

W

Weller's Bay.....	8
Wrecks and Casualties.....	54

APPENDICES.

	PAGE.
B	
Board of Examiners of Masters and Mates, Report of Chairman.....	165
E	
Expenditure, statement of, 1894.....	79
do from Confederation to 30th June, 1894.....	180
H	
Hydrographic work, Chief Engineer's Report.....	82
J. Stewart, Report of Progress—Surveys of the Great Lakes.....	84
Survey of Tides and Currents, W. B. Dawson.....	85
L	
Live Stock Shipments.....	141
Record of, shipped from Montreal, 1894.....	141
do Halifax in December, 1894.....	150
Life Boat Stations, Report of Alfred Ogden on efficiency.....	167
do Statement of.....	170
Lighthouses, &c., and Steamers of Marine Branch maintained in respective agencies to 1894.....	184
Legislation, Acts amended.....	175
M	
Meteorological Service.....	112
Storm Signal Service.....	114
Weather forecasts.....	115
Predictions.....	116
Inspector's Reports.....	118
Magnetic Observatory.....	124
Time Service.....	125
Quebec Observatory.....	126
St. John do.....	127
McGill College Observatory.....	128
Abstract for year 1894.....	130
Kingston Observatory.....	132
Messenger Pigeon Service.....	163
Report of D. Mills.....	16
	3
R	
Revenue, statement of.....	81
Rewards for Humane Service.....	172
S	
Steamboat Inspection.....	133
Chairman's Report.....	133
Montreal Division.....	136
Quebec do.....	136
Maritime Provinces Division.....	136
Prosecutions for Violation of Act.....	137
Penalties.....	140
Signal Service, Report of H. J. McHugh.....	154
do Telegraph and Semaphore Service.....	160
Sick Mariners' Dues.....	174
W	
Wharfs, statement relating to.....	151



REPORT OF THE DEPUTY MINISTER.

To the Honourable

JOHN COSTIGAN,

Minister of Marine and Fisheries.

SIR,—I have the honour to report on the transactions of the Marine Branch of this department for the fiscal year ended 30th June last, and to give an account of a portion of the business up to date.

In the appendices to this report will be found reports from the chairman of the Boards of Steamboat Inspection and Examiners of Masters and Mates; the reports of the Chief Engineer on Hydrographic work, the Inspectors of live stock shipments, the Director of the Meteorological and Magnetic service, the Inspector of Signal service, and reports on the life-boat stations, messenger pigeon service, rewards for humane service, together with statements of revenue, expenditure, sick mariners' dues, wharfage and wrecks and casualties.

The total amount expended on the various branches of the public service during the fiscal year ended 30th June last was \$850,666.46. The salaries of the established staff, including Marine and Fisheries, amounted to \$45,014.54.

The total amount voted by Parliament was \$929,769.03, not including the departmental salaries. It will thus be seen that during the fiscal year the expenditure was \$79,102.57 less than the amount voted by Parliament.

The whole number of persons in the outside service of the Marine Branch at the date of the report is 1,503.

During the past fiscal year the expenditure for maintenance of Lighthouse and Coast Service amounted to \$442,507.34 and for construction of lights \$28,041.93; total for maintenance and construction \$476,225.85, while for the previous year the expenditure for Lighthouse and Coast Service, including construction, was \$503,360.25, showing a decrease of expenditure for the year ending 30th June last of \$27,134.40. The appropriation for this service was \$534,820.00; the expenditure being \$31,459.75 less than the appropriation of Parliament for the fiscal year.

LIGHTHOUSE SERVICE.

The lighthouse service of the Dominion is divided as follows:—The Ontario division, embracing all lights from Montreal westward to the North-west Territories; the Quebec division, extending below Montreal and including the River and Gulf of St. Lawrence and the Strait of Belle Isle; the Nova Scotia division, including St. Paul's Island, Cape Breton, Sable Island and Cape Race, Newfoundland; the New Brunswick division, the Prince Edward Island division and the British Columbia division, each including lights within the provincial boundaries. The total number of light stations, light-ships and fog-alarm stations in the Dominion on the 30th of June, 1894, was 624, and of lights shown 755; the number of steam-whistles and fog-horns, 61; the number of light-keepers and engineers of fog-alarms with masters of lightships was 630.

The following is the number of lights shown, of fog-whistles and fog-horns in the Dominion on the 31st of December of each year, from 1868 to date inclusive. The number of light stations on the coast of Newfoundland maintained by the Dominion, is included.

	Light Stations.	Light- houses.	Fog- whistles.	Fog-horns.
31st December, 1868.....	198	227	2	
do 1869.....	219	233	2	
do 1870.....	240	278	4	
do 1871.....	264	297	8	
do 1872.....	280	314	13	
do 1873.....	316	363	17	
do 1874.....	342	384	18	
do 1875.....	377	444	22	
do 1876.....	407	488	24	
do 1877.....	416	509	25	2
do 1878.....	427	518	25	4
do 1879.....	443	542	23	6
do 1880.....	452	551	22	7
do 1881.....	462	553	23	9
do 1882.....	470	562	23	9
do 1883.....	484	578	23	9
do 1884.....	507	597	23	10
do 1885.....	526	617	23	12
do 1886.....	534	625	23	16
do 1887.....	561	658	23	24
do 1888.....	569	664	23	27
do 1889.....	579	675	24	29
do 1890.....	599	705	23	32
do 1891.....	605	710	23	31
do 1892.....	617	741	23	34
do 1893.....	619	749	24	34
do 1894.....	624	755	22	39

ONTARIO LIGHTHOUSE DIVISION.

This division includes the lighthouses and lightships in that part of the province of Quebec lying west of Montreal, all the lights in the province of Ontario, embracing the lights on the Ottawa River, the St. Lawrence River, above Montreal, the Great Lakes, and some of the smaller inland lakes, as well as the lights on Lake Winnipeg, in the province of Manitoba.

The number of lighthouses, lighted beacons and light-ships maintained by the Dominion in the Ontario division, as above described, is 222, located at 180 different stations.

The number of light-keepers in this division, paid directly by the government, is 170, but in several cases assistants are employed by keepers and paid by them out of the allowance made by the government for that purpose.

There are also in Ontario two fog-whistles, ten fog-horns and three fog-bells, all located at light stations, as well as four bell buoys.

Besides the lights maintained by this department, as above described, there are in Ontario the following aids to navigation:—Two lights on swing bridges maintained by the owners of the bridges; a system of lights on the Murray Canal, maintained by the Department of Railways and Canals; four pairs of range lights on the Detroit and St. Clair Rivers, maintained by the American vessel owners principally interested; and

thirteen wharf lights maintained by the municipalities or corporations to which the wharfs belong. Seven of these last described stations are aided by this department to the extent of being furnished with the necessary oil for their maintenance.

The lights in this division, with the exception of those on the Bay of Quinté, the Ottawa River, and the small lakes, were inspected during the months of July and August by Mr. Patrick Harty, superintendent of lights, and supplied with the necessary stores for annual maintenance.

The lights on the Ottawa River were not inspected this season because it was not deemed necessary.

NEW AIDS TO NAVIGATION.

Parry Sound Range Lights, Buoys and Beacons.

The five leading lights in the approaches to Parry Sound referred to in last year's report, were put in operation during the past season, after a great deal of unexpected delay.

On the opening of navigation the contractor was called upon to put the buildings in good condition, and claimed to have done so, but when a final inspection was made it was found that the winter had made apparent many defects, and that the work was still far from being in accordance with the specifications. The work was therefore taken out of the contractor's hands, and Mr. W. H. Noble, foreman of works for the department, completed the buildings. It was found necessary to remove the whole of the siding and roof shingles and re-shingle both walls and roofs and renew the cornices before the buildings were weatherproof. This and other extra work which cost \$647.40 is charged against the contract price. Two boathouses were erected for the convenience of the keepers at a cost of \$32.20 and five boats provided, made by contract by Messrs. Wm. Watts & Sons, Collingwood, for \$348.

There has been spent to date in connection with the construction and establishment of the lights \$3,282.87.

The five lights which were first put in operation on the 29th September last, are as follows :—

1. *Walton Island Light.*—This light is located on the westernmost Walton Island, and is the front light of a pair known as the Snug Harbour Range.

The light is a fixed red catoptric light, elevated 39 feet above the level of the bay, and should be visible 7 miles in, and over a small arc on each side of the line of range.

The tower is a square pyramidal wooden building, surmounted by a wooden lantern. It is 29 feet from the ground to the vane on the lantern, and is painted white, with a red stripe 3 feet wide on the side facing the channel.

2. *Snug Harbour Light.*—The second light is built on the south extremity of an island on the north side of the entrance to Snug Harbour, and is distant 3,100 feet E. by N. $\frac{1}{4}$ N. from the first described.

The light is a fixed white catoptric light, elevated 62 feet above the level of the bay, and should be visible 13 miles in, and over a small arc on each side of, the line of range.

The building is of wood, and consists of a square pyramidal tower, rising from the roof of a rectangular dwelling house, surmounted by a wooden lantern. It is 50 feet
11—1 $\frac{1}{2}$

in height from the ground to the vane on the lantern, and is painted white with a red stripe 3 feet wide on the middle of the side facing the channel.

The two lights in one lead in E. by N. $\frac{1}{4}$ N., south of Seguin Bank through the Main Channel to the intersection with the Jones Island Range.

3. *Gordon Rock Light*.—The third light is on the summit of the northernmost Gordon Rock, and is the front light of a pair of leading lights to be known as the Jones Island Range.

The light is a fixed red catoptric light, elevated 40 feet above the level of the bay, and should be visible 7 miles over an arc of 180 degrees between the bearings of S. E. by E. $\frac{1}{2}$ E., round through S. to N. W. by W. $\frac{1}{2}$ W.

The tower is a square pyramidal wooden building, surmounted by a wooden lantern. It is 38 feet high from the ground to the vane on the lantern, and is painted white, with a red stripe 3 feet wide on the middle of the side facing the channel.

4. *Jones Island Light*.—The fourth light is located on the south-west point of Jones Island, distant 2,900 yards S. E. $\frac{1}{4}$ S., from Gordon Rock light.

The light is a fixed white light, elevated 63 feet above the level of the bay, and should be visible 8 miles in, and over a small arc on each side of, the line of range.

The building is of wood, and consists of a square pyramidal tower, rising from the roof of a rectangular dwelling house, and surmounted by a wooden lantern. It is 50 feet in height from the ground to the vane on the lantern, and is painted white with a red stripe 3 feet wide down the middle of the side, facing the channel.

These two lights in one lead in S. E. $\frac{1}{4}$ S. from the intersection with the Snug Harbour Range lights to Gordon Rock, clear of Ariel Rock, Hall Reef, Telegram Rock and Hooper Island Reef, on the starboard hand; and clear of Black Rock and Twin Rock, on the port hand.

5. *Hugh Rock Light*.—The fifth light is located on the summit of Hugh Rock, at the junction of Albert Channel with the main channel.

The light is a fixed white, elevated 34 feet above the level of the bay, and should be visible 7 miles from all points of approach by water.

The illuminating apparatus is dioptric of the seventh order. The tower is a square pyramidal wooden building, surmounted by a wooden lantern. It is painted white, with a red stripe 3 feet wide on the west side.

Vessels entering Parry Sound will make the approach guided by Red Rock light, as previously, until they bring the Snug Harbour Range lights in one, when they will enter the main channel, keeping them in one E. by N. $\frac{1}{4}$ N. until the Jones Island Range is brought into alignment. This alignment is then kept S. E. $\frac{1}{4}$ S., until within $\frac{1}{4}$ mile of Gordon Rock, when they should haul up E. by S., $\frac{1}{4}$ S., leaving Gordon Rock on the starboard hand. When on a line joining Gordon Rock and Hugh Rock they can bear up for Hugh Rock light and keep the course east until within $\frac{3}{4}$ mile of Hugh Rock light, when they again change the course to N. E. by E. $\frac{1}{4}$ E. to pass Cameron Island. After passing Cameron Island the entrance to Parry Sound is free from shoals.

6. *Buoys*.—In connection with the establishment of the channel above described, the spar buoys in the approaches to Parry Sound were changed last spring, and are now moored on or close to the channel side of the following dangers:—

A black buoy at Richmond Rock.

A black buoy at McGowan Rock.

A red buoy at Three Star Shoal.

A red buoy at Ariel Rock.

A black buoy at Twin Rock.

A red buoy at Telegram Rock.

A black buoy on shoal south of Reid Islands.

A red buoy on shoal north-west of Hugh Rock.

A black buoy on 2 $\frac{1}{4}$ -fathom patch S.W. of Carling Rock.

A black buoy on extremity of reef off Bobs Point.

A red buoy on 1 $\frac{3}{4}$ -fathom patch in the inner harbour.

The two buoys shown on Admiralty Chart 1731 south of Carling Rock have been discontinued.

Nigger Island Light Replacing Potters Island Light.

During last winter Mr. Wm. J. Gates successfully completed his contract for the erection of a lighthouse on a pier on Nigger Island shoal, in the Bay of Quinté, and the new light was put in operation on the 6th June last.

The total expenditure in connection with the establishment of this light has been \$2,149.85.

The light is fixed white, elevated 27 feet above the level of the bay, and should be visible 10 miles from all points of approach. The illuminating apparatus is dioptric of the seventh order.

The lighthouse is a square wooden tower, surmounted by a square wooden lantern, the whole painted white. It is 27 feet in height from the deck of the pier to the top of the lantern. It stands upon a crib-work pier sunk in 11 feet of water on the north side of the steamboat channel.

In consequence of the establishment of the light on Nigger Island shoal, as above described, the mast light temporarily maintained on the north point of Potters Island was no longer required and was discontinued.

Pancake Shoal Bell Buoy.

It was found impossible to make satisfactory arrangements by contract for the maintenance of the bell buoy constructed for Pancake Shoal, in Lake Superior, and consequently its establishment in position was delayed until the spring of 1894. Arrangements were consequently made with Mr. T. H. Elliott, fishery officer at Sault Ste. Marie, to have the buoy placed in position and removed for safety in the autumn. The buoy will hereafter be maintained under the direct supervision of the department.

The cost in connection with maintenance during the past season has been \$449.75.

Sault Ste. Marie Wharf Light.

It was found necessary for the accommodation of vessels using the government wharf at Sault Ste. Marie, on the Canadian side of the river, between Lakes Huron and Superior, and from which considerable revenue is derived, to establish and maintain a small light at that place.

The light is a fixed red light, shown from a square tubular lantern hoisted on a pole. It is elevated 14 feet above the level of the river and should be visible two miles from all points of approach.

The light stands on the wharf 25 feet from its S.E. corner. The cost of establishing this light was about \$25.

Richards Landing Wharf Light.

A wharf at Richards Landing, in St. Joseph Channel, District of Algoma, owned by Messrs. Smith & Co., is a place of call for steamers using the north channel, and is also a turning point in that channel. The owners of the wharf have arranged with the government to maintain a light upon it without other expense to the government than the provision of the necessary oil and illuminating apparatus. This light was put in operation on the 4th September, 1894, and is a fixed white light, shown from a seventh order dioptric lens lantern, hoisted on a wooden framework placed at the outer end of the wharf. It is elevated 21 feet above the level of the water and should be visible 9 miles from all points of approach.

The framework on which the lantern is hoisted has a shed or small cabin at its base. The structure is about 15 feet high and is painted white.

Lottie Wolf Rock Buoy.

The opportunity was taken during the past season of the presence of the surveying steamer "Bayfield" in Georgian Bay to establish a buoy near the danger known as Lottie Wolf Rock off the north side of Hope Island, Georgian Bay. The buoy is a red spar, moored in 22 feet water, and from it Hope Island lighthouse bears S.S.E. $\frac{1}{4}$ E., distant one nautical mile, and the shoal of 9 feet water S. by E., distant 400 yards.

No special expenditure was incurred in connection with the establishment of this buoy, materials on hand on the "Bayfield" being utilized for the purpose.

PRINCIPAL REPAIRS AT EXISTING STATIONS.

Lachine Pier Light.

New sills were placed under the light building at this station, general repairs made, and a new platform built in front of the tower, at a cost of \$71.86.

Lake St. Louis Lightships.

The three Lake St. Louis lightships were last winter, as indicated in last year's report, removed from the water, scraped and painted, and re-launched in the spring. This was done under contract by Mr. Louis Metras, at a cost of \$450 for the three. Miscellaneous repairs were also made on these three vessels under the superintendence of Mr. W. H. Noble, at a cost of \$468.24.

No. 1 lightship was provided with a new illuminating apparatus for the purpose of improving the strength and visibility of the light; the lamps and reflectors heretofore used having been removed from the tower, which stands amidships on the vessel, and replaced by a dioptric apparatus of the seventh order, purchased from Messrs. Chance Brothers and Company, at a cost of \$93.33. The light from the new apparatus shows fixed white from an elevation of 18 feet above the water. Twenty fathoms extra of mooring chain were provided for this lightship at a cost of \$39.96.

The illuminating apparatus of No. 3 lightship was repaired at the same time, at a cost of \$13.50.

Pointe Claire.

Twenty-five cords of heavy stone rip-rap were placed about the pier, and small repairs made, at a total cost of \$116.50. It is found that the concrete pier on which the lighthouse rests is gradually sinking in the south-east corner; probably in consequence of the subsidence of the rip-rap foundation in the soft mud bottom, and it is expected that further repairs will be required to level up the pier during the coming season.

Britannia.

The lighthouse above Britannia, on Lake Deschenes, in the Ottawa River system, was carried off its foundation by last spring's freshet. The pier on which it stood was repaired and raised 4 feet, and the tower replaced during the summer at a cost of \$75.80.

Lancaster Bar.

Fifty cords of rip-rap stone to protect the lighthouse were placed about the pier during the past winter, and repairs made to the station; the total expenditure being \$225.17.

Lancaster Pier.

Twenty cords of stone were placed around the lighthouse foundation at this station on the ice last winter. The contract price for the stone was \$2.75 per cord. This station, like other light stations on the St. Lawrence and Ottawa Rivers where a tower is built on a pier, is surrounded by loose stone which in each case gradually forms an island to serve as a permanent foundation, this being found to be the most efficient and cheapest protection against both the winter shoving and the spring running of ice; by degrees a rocky islet is formed when the stone attains its natural slope until eventually no further stone is required.

McKie's Point.

The dwelling-house and wood shed at this station received small repairs at a cost of \$18.50.

Gananoque Narrows.

A lamp exploded in this light on the 4th Sept., 1894, and damaged the lantern and top part of the tower. The damage done by fire was repaired and advantage was taken of the occasion to remove the small panes of glass from the old-fashioned lantern and replace them by large panes of plate glass; at the same time a seventh order dioptric apparatus of Chance's make was established at the light station instead of the lamps heretofore used.

Jack Straw.

Advantage was taken of the presence of a skilled mechanic at Gananoque Narrows to replace the small old-fashioned glass in Jack Straw lantern by modern plate glass.

Burnt Island.

Repairs were made to the dwelling and barn at this station, under the keeper's supervision, at a cost of \$45.61.

False Ducks.

The tower at this station is one of the fine stone towers erected by the government of the old province of Canada at salient points in the Great Lakes. It is necessary for the preservation of the stonework to keep these towers carefully pointed. The tower and dwelling at this station were pointed and repaired at a cost of \$162.

Wellers Bay.

The lightkeeper's dwelling at this station was put in thorough repair at a cost of \$66.12.

Presqu'Île.

The repairs to the buildings at Presqu'Île light station, Lake Ontario, referred to in last year's report, were completed at a total cost of \$1,457.97. In addition to the work contemplated last year, the crib-work breakwater protecting the tower from the sea, was repaired at a cost of \$159, and extensive repairs and improvements were made to the lighthouse lantern and illuminating apparatus at a cost of \$470.

Point Peter.

A new veranda was built to the dwelling-house at a cost of \$52.26.

Oakville.

In last year's report it was stated that it had been found necessary to move the lighthouse tower inwards from its former position near the end of the main breakwater pier. In consequence of the continued settling of this pier it was again found necessary to move the lighthouse tower and block 36 feet farther shoreward. This was done under Mr. Noble's directions at a cost of \$51.50.

The lighthouse now stands 126 feet from the end of the pier, and vessels entering the river have to allow for this to clear the end of the pier.

Burlington Beach.

Repairs were made to the wire rope railing at this station at a cost of \$21.70.

Port Stanley.

In consequence of the sea breaking over the breakwater pier on which the light-house at this station stands, it was dangerous for the lightkeeper to reach the light

house in heavy storms. A wire rope guard or railing has consequently been provided extending from the shore to the lighthouse. Cost of erection of this rail was \$65.66.

River Thames.

The lightkeeper's dwelling at this station was put in thorough repair under the superintendence of the lightkeeper at a cost of \$95.97 and a new yawl boat suitable for placing and taking up buoys, provided at a cost of \$55.

Goderich.

A new wire fence was put around the lighthouse lot at the main tower at this station under the keeper's direction at a cost of \$71.55.

The breakwater piers in Goderich Harbour having been extended farther into the lake by the Department of Public Works, it was found necessary to remove the front range light a distance of 300 feet west, from its former position, on the block at the previous outer end of the north breakwater, to a block built at an angle, 117 feet from the outer end of the new addition. The crib-work block on which the tower stands is 16 feet square by 4 feet high above the deck of the breakwater and the middle of the tower is now 11 feet from the north edge of the breakwater. The height and character of the light have not been changed.

This work was carried out by Mr. W. H. Noble, foreman of works, at a cost of \$363.

Chantry Island.

The large and valuable stone tower at this station was pointed and whitewashed under the keeper's directions at a cost of \$99

Collingwood.

The light at the turn of the dredged channel, in Collingwood Harbour, has been improved by removing the mast with shed at its base from the crib on which it stood and replacing it by an inclosed lighthouse tower.

The tower is a square, pyramidal, wooden building, painted white, surmounted by a square wooden lantern, painted red.

The height of the building from the pier to the vane on the lantern is 27 feet.

The light, which was first shown from this tower on the 10th August last, is a fixed red light, which should be visible from all points of approach in the channel, six miles. It is elevated 27 feet above the level of the bay.

The building was erected under contract by Mr. D. Peterman & Son of Collingwood for \$195.

The total expenditure involved in making the change, including the improvements to the illuminating apparatus, and repairs to the piers and surroundings, has been.

Hope Island.

Some difficulty has been experienced during the past two years with the clockwork revolving the illuminating apparatus in this lighthouse, and temporary repairs have been made by the first engineer of the government steamer "Bayfield" and local

mechanics. Mr. Noble visited the station last April and put the clockwork permanently in order, after the light had been stopped for some days, and no failure in the light has since occurred. No expense was incurred beyond travelling expenses.

Red Rock, Parry Sound.

This is one of the most exposed stations on our inland waters, and consists of a wooden lighthouse standing on a crib-work pier on a bare, rounded, granite rock, exposed to the full force of all westerly storms, and to the full sweep of the Georgian Bay. In bad weather the sea breaks completely over the whole building.

This building was erected in 1881, and the crib-work pier foundation was becoming unsound. It was felt that in a situation so dangerous the department could not afford to run any risk of the building being swept away, and it was consequently determined to replace the crib-work foundation by a more solid structure. The pier was consequently during the past season replaced by a steel cylinder 45 feet in diameter by 12 feet 6 inches high, filled with stone masonry and Portland cement concrete. In the interior of this, a cellar 15 feet in diameter has been left. The wooden sills of the light building have been replaced and the wooden building put in thorough repair including a new roof of heavy tinplate. The total expenditure in connection with this work, which was done by day's labour, under the superintendence of Mr. W. H. Noble, foreman of works, has been \$3,069.65.

Kagawong.

As indicated in last year's report, Mr. Noble was sent to Kagawong in September last, and erected a lighthouse tower to replace the temporary light maintained since the mast and shed were destroyed by fire. This tower was completed for the sum of \$293.81, thereby justifying the department's action in refusing to accept any of the tenders received for the work, the lowest of these having been \$925.

The tower is built in the same location as the original mast, 75 feet back from the shore-line, and 100 feet westward from the public wharf.

It is a square pyramidal wooden building, surmounted by a wooden lantern, and is 27 feet high from its base to the vane on the lantern. The tower is painted white, the lantern red.

The light is a fixed white, catoptric light, elevated 38 feet above the level of the bay. It should be visible 11 miles from all points of approach by water. It was first shown from the new tower on the 29th October, 1894.

Twin Rock Beacon, Parry Sound.

The beacon on Twin Rock, in the entrance to Parry Sound, which had been blown down, was re-erected under contract at a cost of \$45.

Fort William.

The range lights at the mouth of the Kaministiquia river requiring improvements and repairs, the chief engineer took the opportunity, when visiting the station in September last, of preparing a specification for renewing the foundation of the back range light building, raising the back and front towers 10 feet each, renewing the elevated

walk between them ; and making sundry repairs, and let a contract for the work for \$232.

This work has probably been completed, but no report has been received.

In addition to the above repairs, all ordinary paintings and small repairs required for keeping the light stations in good condition, were done in the usual way.

Pancake Shoal Bell Buoy.

Tenders were invited publicly for placing this buoy in October, 1893, but no tenders were received. The buoy was conveyed from Owen Sound to Sault Ste. Marie, during the season of 1894, at a cost of \$30. Several private offers were received for placing the Pancake Shoal buoy, together with a spar buoy on a shoal 3 miles from North Point of Persian Island, one about 3 miles west of West Point Sandy Island, and one 6 miles north-west of Coppermine Point. The offers were considered too high and arrangements were made to place the above mentioned buoys and take them up by hiring a tug and scow, for the time it required to do the work. The placing and taking up cost \$419.75. The offers were \$1,060 and \$450 respectively. The spar buoys cost \$50 made by contract. There are two spare ones.

QUEBEC LIGHTHOUSE DIVISION.

The Quebec division covers an extent of river and coast service over 1,200 miles, comprising all the lighthouses in the Richelieu River and Lake Memphremagog ; all the lighthouses, lightships, gas buoys, and beacons from Montreal to Quebec and below Quebec ; all lighthouses, lightships, gas buoys, wooden buoys and beacons, fog-alarms, bombs, and cartridge fog signals in the River St. Lawrence, Saguenay River, north side of the Baie des Chaleurs, Gulf of St. Lawrence, Strait of Belle Isle, north and west coasts of Newfoundland, and Labrador. This division is under the control of J. U. Gregory, agent of the Department of Marine and Fisheries at Quebec.

Besides the above the agent attends to any other duties required by the department for the Marine and Fisheries services, and is also shipping master, attends to the requirements of the British Board of Trade in connection with shipwrecks and distressed seamen, casualties at sea, and is receiver of wrecks and supervisor of wharfingers in the province of Quebec.

His staff consists of Mr. L. A. Blanchet, accountant, and deputy shipping master ; Mr. George D. O'Farrell, and Mr. Alphonse Hamel, clerks ; Mr. N. Fitzhenry, store-keeper and wharfinger. The workshops are under Mr. O. J. Samson, master carpenter ; and Mr. G. Vezina, master shipsmith ; and the gas works under Mr. G. Belanger, engineer, with such assistance as required.

Mr. Gregory again bears testimony to the willingness and courtesy with which his staff have individually and unitedly aided him to carry out his orders.

The steamers at the disposal of the agency to meet the demands of the district, have been the SS. "Alert" and a tug engaged as occasion required during the absence of the "Alert." The Fishery Protection steamer "La Canadienne" supplied the stations below Pointe des Monts and the SS. "Alert" those from Pointe des Monts to Quebec until the "Druid" was available after the 14th June, 1894, when she took the place of the "Alert," and the "Alert" having been condemned by the surveyors as unfit for further

work in the Gulf, was put out of commission. The service of lights between Quebec and Montreal was by freight and passenger steamer, rail, and hired tug, during the absence of the "Alert."

The inspection of the light stations served by the steamer "La Canadienne" on her spring trip was made by Captain McElhinney of the headquarters staff, and on the autumn trip by Mr. P. Harty, inspector of lights above Montreal, and the inspection of stations served by the steamer "Alert" was made by Mr. Blanchet, accountant at Quebec.

There are in this division 153 lights and 116 stations, 8 lightships, 3 of which are supplied with steam fog-whistles 9 explosive bomb stations in connection with light-houses, 2 fog-whistles and 9 steam fog-horns at light stations, 10 gas buoys, 4 of which are supplied with bells, a number of wooden can buoys maintained directly by the department and 59 day beacons.

NEW AIDS TO NAVIGATION AND IMPROVEMENTS TO EXISTING ONES.

Cape Salmon.

The lighthouse and fog-alarm building at Cape Salmon referred to in last year's report were completed under contract and put in operation on the 15th September last.

The fog-alarm building stands close to the face of the cape, which at this point rises to a height of 33 feet almost perpendicularly from the water. The light building stands immediately behind or north-west of the fog-alarm building, and is partly hidden by it. It is a wooden combined lighthouse and dwelling-house, the square tower rising from the middle of the south-east face of the dwelling. The walls of the building are white. The dwelling roof is unpainted. The iron lantern surmounting the tower is painted red. The height of the building from its base to the vane on the lantern is 46 feet.

The light will be a revolving white light, showing flashes with intervals of 15 seconds between their points of greatest brilliancy. The light will be elevated 77 feet above high water mark and should be visible 14 miles from all points seaward, between the bearings of S. S. W. $\frac{1}{4}$ W. through W. to N. E. by E. over an arc of 211° .

The fog-alarm will consist of a horn operated by steam and compressed air, which will give blasts of 8 seconds duration with intervals of 22 seconds between them, or a blast every half minute.

The fog-alarm building is a square wooden building, painted white, with an unpainted roof, and stands immediately south-east of the lighthouse, the horns point south-east, and are elevated 46 feet above high water mark. The machinery is in duplicate so that in the event of one horn or boiler becoming inoperative the other may be put in operation.

The expenditure in connection with establishing the light and fog-alarm stations to date has been \$4,008.06.

The establishment of this light and alarm station completes the scheme for rendering safe in the night and in thick weather navigation in the wide and clear channel North of Hare Island, and the department has received many assurances of the assistance which the aids in question have given ships of big draught, and understands that the number of vessels using the channel north of Hare Island instead of the South Channel, is steadily increasing.

Improvement in Explosive Fog-alarms.

Complaints having been received from masters and pilots that the fog guns used at several of the light stations in the gulf and river in consequence of the long period of half an hour between the explosions, it was decided to replace these guns by cotton powder cartridges exploding every twenty minutes, at the following stations :—

Cape Gaspé, Bird Rocks, Heath Point, West Point, Anticosti, Pointe des Monts, Father Point, Green Island.

The new signal is exploded from a derrick erected on the roof of the gun shed or close to the point from which the gun was previously fired.

The explosions should give loud reports, sharper than those from pieces of ordnance.

Until the supply of gunpowder at several stations is exhausted, the guns will be used when the weather conditions are most favourable for the transmission of sound, but when used, will be used with intervals of 20 minutes instead of 30 minutes as formerly.

The increasing speed of vessels navigating the gulf and river which rendered more frequent fog-signals desirable as explained in the last paragraph, also rendered desirable a shortening of the period of revolution of each light on Bicquette Island, Grande Isle, Kamouraska and Stone Pillar. From the opening of navigation last year Bicquette was consequently made a revolving white light attaining its greatest brilliancy every 45 seconds. Grande Isle, Kamouraska revolving white lights with an interval of 30 seconds and Stone Pillar a revolving white light attaining its greatest brilliancy every 30 seconds.

BUOYAGE OF SHIP CHANNEL BETWEEN QUEBEC AND MONTREAL.

This department has charge of the buoys in the ship channel, between Quebec and Montreal, under a contract with the Sincennes-McNaughton Line. During the past season, several improvements were made in the channel by the Department of Public Works, and as these improvements were completed, the buoys marking the channel in the several vicinities were rearranged to suit the changed circumstances.

On the opening of navigation this year eight buoys in Lake St. Peter were thus moved and changed to suit improvements. Three new spar buoys were moored for marking the Grondines anchorage, two new can buoys were placed to mark the Cap Levrault and Cap à la Roche cuts, and nine existing buoys between Cap Levrault and Grondines were moved or improved.

In August last four buoys marking the Varennes curve were moved in consequence of the improvements in the dredged channel at that place.

Discontinuance of Beacons showing Range over Horseback Shoal.

In consequence of the completion of the dredging of the 27½ foot ship channel across Poulieu Dos de Cheval, (Horseback Bar), the day beacons heretofore maintained below Cap Charles on the River St. Lawrence, between Quebec and Montreal, known as the Horseback Bar beacons, and which mark the channel previously used, have been abandoned, and will no longer be maintained.

The line of the centre of the 300 feet wide dredged ship channel referred to, is marked by the front range light at Cap Charles in one with a day beacon erected 1,274 feet W. by S. $\frac{7}{8}$ S. from the front light. The beacon is diamond shaped, 10 feet square, painted black with a white centre. Its top is 45 feet above the ground, and 156 feet above high water mark. It is proposed to erect a lighthouse in place of this beacon so as to show the alignment at night.

Heavy draught vessels going up the river keep the alignment of an elm tree in Upper Lotbinière with the spires of Lotbinière church until they bring Cap Charles front light in one with Cap Charles beacon, as above described, which leads them over Horseback Bar in the middle of the new channel. This alignment should be kept on a bearing of W. by S. $\frac{7}{8}$ S. until the alignment of the Ste. Emilie range lights is reached.

The semaphore previously maintained by the Montreal Harbour Commissioners was taken over with the buoys, and has since been maintained by the government at St. Jean des Chaillons to indicate the depths of water on the bar at Cap à la Roche. In consequence of the completion of the dredged channel at that point, the semaphore was no more required at St. Jean, and was consequently removed to the village of Lotbinière during last summer, for the purpose of indicating the depth of water at Barre à Boulard during the dredging operations. This change was carried out by Mr. W. H. Noble at a cost of \$344.63.

Early last spring Capt. L. R. Demers, who had served in the department as master of the steamship "Druid," as acting superintendent of lights and as superintendent of the buoy service, resigned his position, and it was found that no other officer in the agency had the necessary information to enable him to place the buoys below Quebec. The chief engineer consequently accompanied the "Alert" when the buoys were placed in the spring of the year, and a complete list of these buoys, with their positions and sextant angles for determining their positions, cross bearings, &c., was made for permanent reference in the department. It was found that two of the buoys previously used were not required, and they were permanently discontinued, viz., a black and white can boy on the south-west extremity of the channel patch and a red buoy off the east extremity of Red Islet bank.

Removal of Buoy in Gaspé Harbour.

A black can buoy heretofore maintained at the extremity of Lourde Spit at the entry to Gaspé Basin was removed as unnecessary.

PRINCIPAL REPAIRS TO EXISTING STATIONS.

Anticosti South-west Point.—This being one of the oldest stations in this district considerable repairs due to age were required, workmen were sent down from Quebec for that purpose. Expenditure, \$167.77.

Anticosti South Point.—New windows, new roof, and painting were required, for which the keeper needed assistance from Quebec, costing \$81.73.

Anticosti West Point.—This is one of the oldest buildings in this district, and the sea has been encroaching annually upon the tower, a breakwater was erected for its protection, and for many years served the purpose, but needed considerable repairs, the

men were sent down from Quebec, to carry out the work, the buildings were also painted, at a total cost of \$431.16.

Ash and Bloody Islands.—The foundation of the buildings required repairing which was done by a local mason, at a cost of \$39.

Belle Isle.—The powder magazine required some repairs, and the buildings to be painted, which was done at a cost of \$76.17.

Bird Rocks.—The boiler of the hoisting gear was brought up to Quebec, for repairs, and another boiler on hand was erected in its place at a cost of \$104.83.

Cape Bauld.—The foundations of the building at this station were reported in very bad condition, not being able to procure proper workmen and material on the spot, they were sent from Quebec at a cost of \$446.34.

Cape Chatte.—The buildings at this station required painting, the keeper was authorized to hire assistance to do the work and which he did at a cost of \$35.

Cape Despair.—The plate glass of the lantern was cracked in several places and required renewing, and also some repairs to the buildings required, a competent man was sent from Quebec to do the work, which cost \$82.64.

Cape Gaspé.—Owing to the exposed position of the building at this station, it became necessary to protect the tower by guys, which were placed by the keeper at a cost of \$22.45.

Cape Magdalen (Above).—The towers at this station were repaired by a man sent from Quebec, at a cost of \$54.94.

Cape Magdalen (Below).—The necessary repairs and material also painting were attended to by the keeper, and assistance allowed at a cost of \$90.35.

Cape Rosier.—Repairs to buildings due to age were necessary, also the road required to be put in order, this work was performed by the keeper with hired help, at a cost of \$95.50.

Champlain.—The front tower required repairs, and painting, which was performed by the keeper and a local mechanic costing \$57.

Saguenay River Lights.

In August, 1893, the chief engineer with the agent visited the River Saguenay, and inspected all light stations between Chicoutimi and Tadousac, obtaining the information respecting the lights which is embodied in notice to mariners No. 5 of 1894. These lights were originally established by private enterprise and the buildings are of very cheap description. They will probably require a renewal at an early date.

Egg Island.—A wood shed and repairs were required at this station which was attended to by the keeper and local assistance at a cost of \$125.49.

Fame Point.—The road from the lighthouse to the main road called the Maritime road, was authorized by the department to be carried out, under the supervision of Mr. James Ascah, the lighthouse keeper, which was fully completed at a cost of \$385.00.

Isle à la Pague.—Repairs to the tower of this station were found necessary, the work was given out to a local mechanic named L. Dubois, at a cost of \$78.95.

Isle aux Prunes.—The repairs and painting to this station were performed by a workman sent from Quebec, assisted by the keeper at a cost of \$52.70.

Isle de Grace.—The pier at this station was considerably damaged by ice, and the tower also required repairs and painting ; the work was performed by Mr. F. Turgeon, and assistants at a cost of \$163.74.

Isle Ste. Thérèse.—The back tower at this station required repairs, and reshingling and painting ; Mr. F. Turgeon was sent up from Quebec to do this work, at a cost of \$143.88.

Kamouraska.—The tower at this station required repairs at different places, which were performed by a local workman, N. Laplante, costing \$44.08.

Lavaltrie.—The pier at this station was considerably injured by ice, and was repaired by the keeper and a local assistant, at a cost of \$83.18.*

Lotbinière.—The two range towers were repaired and painted by Mr. P. Desruisseaux, assisted by the keeper, at a cost of \$53.20.

Martin River.—The keeper at this station, with local assistance, did the necessary repairs and painting, at a cost of \$40.81.

Matane.—The boat at this station which also serves to place the buoys required extensive repairs or renewing ; the repairs were made under the supervision of harbour master, Mr. G. L. Pelletier, at a cost of \$28.47.

Métis.—A new fence was put up, and the tower painted by the keeper and local assistants at a cost of \$35.10.

North Half Way Point.—The pier supporting the front tower of this station was considerably damaged by the ice, and required repairs and adjusting ; this work was done by the keeper and assistants, at a cost of \$39.60.

Perroquet Island.—The dwelling required wainscoting and repairs as well as painting, the keeper did the work, with local assistance, at a cost of \$65.82.

Plateau Rock.—The masonry of the foundation needed considerable overhauling and repairing. The work was done by the keeper, with the assistance of a local mason, costing \$38.25.

Pointe aux Trembles.—Repairs and painting were done to both towers by Mr. F. Turgeon of Quebec, assisted by the keeper, at a cost of \$32.25.

Point des Monts.—The bridge at this station crossing a gully was repaired by the keeper and assistant at a cost of \$15, and lumber was sent down to repair building affected by old age, total cost of which is \$102.60.

Point Rich.—Clapboarding the building, new stairs, shingling the shed, painting the buildings, and making a drain, erecting a flagstaff, were done by Mr. O. J. Samson and assistants from Quebec, at a cost of \$314.78.

Port St. Francis.—Extensive repairs were required to the pier supporting the moveable back tower, which were carried out by Mr. O. J. Samson and local assistants, at a cost of \$198.95.

NOVA SCOTIA LIGHTHOUSE DIVISION.

During the past year Mr. H. W. Johnston, who has been since confederation agent of the department for the province of Nova Scotia, and under whose efficient management the aids to navigation were admirably maintained, was superannuated.

The department also lost by death, the services of Mr. A. Warner, chief engineer of the "Newfield," another old and faithful servant.

The Nova Scotia division was, on the superannuation of Mr. Johnston, put in charge of Mr. Jonathan Parsons as agent. It comprises :

178 lighthouses, exhibiting 190 lights.	97 iron can buoys.
1 light vessel.	About 700 spar and other small buoys.
16 steam fog-alarms.	8 stationery beacons.
1 signal bomb station.	15 life boat stations.
18 hand fog-alarms.	3 humane establishments.
2 fog-bells.	4 signal stations.
16 automatic whistling buoys.	Steamships "Newfield" and "Aberdeen."
11 iron bell buoys.	

The lighthouses and fog-alarms throughout this division have been inspected by Mr. C. A. Hutchins, superintendent of lights, and the boilers and machinery at the fog-alarm stations have been examined by Mr. Stewart, chief engineer of the "Newfield."

New Light Established.

A new lighthouse is in course of construction on Gillis Point, Bras d'Or Lake, and is intended for the guidance of vessels navigating that portion of the lake east of the Grand Narrows bridge. The work is now nearly completed, and it is intended to put the light in operation on the 1st day of January, 1895, and at the same time abolish the light at Uniacke Point which is located at the northern end of the Narrows Bridge and will be of no further use. The lighthouse is being built by Mr. N. W. McKenzie under contract for the sum of \$1,323.

IMPROVEMENTS.

Sand Point or Eddy Point.

A new square tower was erected on the eastern side of the old lighthouse last fall by Mr. T. M. Crow, of Truro, N. S., under contract, for the sum of \$800. When inspected in December last by the superintendent of lights, it was found that certain conditions of the specification had not been complied with, especially with reference to the foundation walls. Owing to the lateness of the season the necessary alterations had to be deferred until this year, and other difficulties arising, the new light has not yet been put in operation. It has, however, been arranged to effect the change on the 1st day of January, 1895, when the one fixed white light, shown from the lantern on new tower, will take the place of the two horizontal lights at present displayed. The new illuminating apparatus being more powerful than the old, will be of great benefit to vessels approaching from the southward and eastward.

Herring Cove.

The mast, with shed at base, from which a light was exhibited, has been replaced by an enclosed tower, 22 feet high from base to vane on the lantern. This work was done by Mr. John Chisholm by days' work at a total cost of about \$225. The materials were purchased here and sent to the station by the "Newfield."

Barrington Lightship.

In addition to the fixed white light heretofore exhibited from the foremast head, a fixed red light is now shown 20 feet below the upper white light from two red lanterns rigged one on each side of the mast in such a manner that the mast will not intercept the light to seaward. This change was considered advisable in order to distinguish more readily the light from shore lights or another lights of vessels moored in the vicinity of the lightship, and was put into operation on the 1st day of June last.

Mullins Point.

The temporary pole light heretofore used as a back range light has been replaced by a lighthouse tower and keeper's dwelling combined, and the light was combined, and the light was changed from the pole to the tower on the 25th August, 1894. The ighthouse was built and the old oil store removed to a new site by Mr. Daniel McDonald, of Pictou, under contract, for the sum of \$1507.00.

Eastern Harbour—Cheticamp.

Two new inclosed towers have been constructed to replace the pole range lights up to the present in use. The work was done under the supervision of Mr. John Chisholm, employing local labour. The materials were purchased in Halifax and sent by the "Newfield." The two towers were completed November 6th, and the lights were exhibited first in them on November 7th. Both towers cost only \$560.00, a sum far below the lowest tender sent in (\$998.00).

The following repairs and improvements in additions to ordinary and small repairs and paintings have been made at various stations :—

EAST OF HALIFAX.

Meagher's Beach.

In consequence of damage done by the sea to the breakwater on south side of beach, the following repairs have been effected :—

About 250 feet of old work repaired by fitting new iron ties and waling pieces, replanking and refilling with about 200 tons stone ballast.

About 40 feet of the outer row of piling, carried away by the sea, has been replaced by crib-work, filled with stone ballast and planked. About 25 feet of old work has been recently carried away by the sea, and will be replaced by new crib-work at once. The outer ends of two of the groins on southern side will also be repaired. All this work has been, and is being, done under the supervision of Mr. Edward Horne, the lightkeeper, and local labour employed.

Jeddore.

The floor in cellar and woodhouse have been removed, boat sail, ladder and spy-glass supplied.

Egg Island.

The lighthouse tower has been re-shingled on six sides, and all the sills renewed ; four new screw buckles fitted to stays, and buildings painted. The boat slip at landing has also been repaired.

Pope's Harbour.

Roof of porch re-shingled, and three panes lantern glass replaced and new screws furnished for window clamps. A new boat supplied to station.

Sheet Rock.

The north side of kitchen roof, roof and sides of porch and roof of boat house have been re-shingled, platform at boat landing and boat repaired, and two new reflectors supplied to lamps in lantern. Lighthouse and buildings painted.

Beaver Island.

Replastered ceilings in two rooms, wainscoted kitchen and pantry, new floor in kitchen, hung seven doors, repaired cellar floor, new sashes in cellar windows, new steps to cellar, repaired all doors and locks in house, fitted new spouts on one side of building, built a new boat slip 80 feet long. New spindle fitted with steel centre points supplied to revolving clock ; stove for lantern supplied.

Isaac Harbour.

Two new lamps complete furnished, and new doors fitted to outside entrance to cellar. A new boat furnished.

Country Harbour.

A new hand cart supplied. Fifty dollars granted to be expended on repairing road between landing and lighthouse. The store at landing moved back 30 feet, new sills fitted and shingling repaired.

Tor Bay.

Fence around lot renewed, and porch re-shingled, chimney flue and roof repaired.

Crow Harbour.

Roofs of kitchen and boat house reshingled.

Jerseyman's Island.

The breakwater surrounding the three seaward sides of foundation walls of lighthouse having decayed, has been renewed. The work was done by Mr. George Vigneau under contract for \$100.

Arichat.

Lantern deck repaired, and leaks on roof of dwelling stopped. New boat supplied. Buildings painted outside.

Petit de Grat.

New copper ventilator fitted to lantern, and sills under lantern renewed. Buildings painted; oil store re-shingled.

A notice to mariners was issued drawing attention to the fact that this light was wrongly located on the admiralty charts.

Green Island.

Crown roof of building on which lantern stands has been recovered with canvas. New fly spindle supplied to revolving clock.

Guyon Island.

A new shaft with centre points has been fitted to revolving clock, and lantern deck patched with canvas. Four new reflectors supplied to lantern. New lantern blinds and rollers, composition hinges fitted to lantern door.

Main à Dieu.

Replaced two new sills under dwelling, rebuilt cellar wall under one side, reshingled both sides of roof, gave roof of wood shed greater pitch and reshingled roof and walls, built a new porch and repaired lantern deck.

Scattarie.

Roof of kitchen re-shingled. All panes glass in lantern reset with rubber strips, six new sills fitted under lantern, lantern floor repaired, and repaired door in dwelling.

Low Point.

All the plate glass has been taken out of lantern, and reset with rubber strips. Roof of dwelling partially reshingled.

Black Rock Point.

Retaining crib-work built on face of road leading up from landing. New boat supplied.

Cape George.

New oil store built.

A survey was made of a piece of land known as The Head, about 38 acres, and proceedings taken to expropriate it, the land on which the lighthouse stands not having been previously acquired by the government.

Ingonish Harbour.

Base tower re-shingled where torn off by the sea, and oil store moved back and set in foundation walls.

Margaree.

Twelve new copper smoke pipes supplied to lantern and iron water tank put in cellar. One new sill and beam fitted in tower, boarding renewed where necessary, two sides reshingled, three new sills under lantern, deck recovered with canvas, new sills under porch and re-shingled one side, new floor to porch, plaster and cellar walls repaired, one room wainscoted, one new door, and new casings to two doors, three new sashes fitted to dwelling, new steps to porch. Two new sills and two beams under oil store, new door sills, one side re-shingled. New boat and stove for lantern supplied.

Port Hood.

Three new lamp fountains supplied. Buildings painted outside, and addition of eight feet made to kitchen, roof stripped and reshingled, new conductors fitted leading to cistern, cistern in cellar repaired.

Ponquet.

New boat supplied, the old one being too large was taken off and placed at Pictou Island Station.

Pictou Island.

A new iron lantern has been erected on a new platform built for that purpose ; new sills and door to back cellar porch, new steps and floor to front porch, kitchen porch reshingled, zinc shingles fitted between kitchen roof and walls of tower, one new window sash and steps repaired in oil store ; shingles along base of tower. Plaster in house repaired. This work was done by Mr. Daniel McDonald, builder, Pictou.

Carribou.

Roof of oil store reshingled, and line fence renewed.

Pugwash.

Walls of oil store reshingled, and line fence renewed.

Pictou Bar.

Roof of kitchen reshingled, new steps to back door, new pipe fitted to kitchen pump, chimney repaired, two new lamps and reflectors supplied. Buildings painted outside.

WEST OF HALIFAX.

Betty's Island.

A new boat house is being built this fall at landing in Gallantry Cove. Two new ladders supplied.

Hubbard's Cove.

Roof of kitchen and wood shed re-shingled. Plaster in kitchen ceiling repaired.

Hobson's Nose.

A crib-work breakwater 150 feet long, 6 feet high and 10 feet wide, ballasted with stone and planked all over, has been built on the northern side of the island, to prevent the sea washing away the bank at that point. The work was done by Mr. Allan Struin, of Mahone Bay, under contract, for \$350.

Battery Point.

By the explosion of a lamp the lantern glass was destroyed and lantern damaged. New glass was put in and lantern repaired by Mr. Amos McLellan, our foreman. A hand fog trumpet has been placed at this station to be sounded in thick weather in answer to signals from vessels.

Moser's Island.

Buildings stripped and resingled all over and painted, new finish around eaves, five new window frames, sills on two sides repaired, two new windows in cellar, sky-lights and windows repaired in main building, new sills under porch walls under building repaired. Work was done by Geo. E. Wolfe, of Getson's Cove.

Port Medway.

Roof of store at landing resingled, and platform in front of building renewed.

Coffin's Island.

Foundation wall under porch of tower rebuilt, new entrance gates supplied and cellar door repaired.

Little Hope.

New shaft and steel centres fitted to revolving clock new pall spring; gear overhauled and put in order. Landing slip repaired.

Carter's Island.

Retaining wall built on each side of boat-house, and boat slip repaired.

Page's Island.

Well dug to supply fresh water. Buildings painted.

Cape Sable.

Roof of kitchen resingled, and chimney repaired. New cog-wheel supplied to revolving clock.

Cape Negro.

New chimney built in dwelling and landing slip repaired. Buildings painted.

Barrington Lightship.

Moorings lifted and replaced. Two new lanterns and gear supplied for the lower light. Ship painted.

Bon Portage.

New girt fitted on one side of tower. Shingled roof of boat-house and south wall; hung two doors and fitted capstan in bedding.

Pubnico.

Kitchen chimney taken down and rebuilt from second floor. Underpinning under the east end of building rebuilt with cement mortar.

Bunker Island.

Plank floor laid in cellar and steps fitted. A water closet built under bell tower. Boat repaired.

Cape St. Mary's.

Frame under lantern repaired. Foundation walls under lighthouse porch and in cellar repaired. Buildings painted.

Boar's Head.

Roofs reshingled, new conductors and spouts fitted, and tank cemented inside.

Point Prim.

Roof of kitchen and shed reshingled. Buildings painted.

Digby Pier.

Shed painted and sanded to prevent cutting with knives.

Isle Haute.

Kitchen pump supplied and 30 feet drain crook laid from kitchen sink.

Kingsport.

New ventilator, north side of tower sheathed outside, new corner boards fitted, new rail on one side, new moulding under window sill and lantern, new hinges to door fitted.

Parrsboro'.

An addition of four feet made to kitchen, a covered way built from tower to shed, one side and roof of dwelling reshingled, repaired gutters, fitted new spouts and galvanized iron conductors, re-ceiled partition on second floor, fitted new windows, new

sills under lantern, new glass in lantern, sheathed walls under lantern with zinc. Plaster repaired in two rooms. Work done by our foreman, Mr. McLellan.

BUOY SERVICE.

Towards the latter end of April last heavy gulf ice was driven by a long continuance of easterly winds as far west as Sambro, carrying away several of our automatic coast buoys outside Halifax Harbour. Gulf ice has never been carried so far west on our coast within the past fifty years. As soon as the ice opened sufficiently the inspector proceeded in the "Newfield" to look for the buoys, and succeeded in picking up two automatic and one bell buoy; the other automatic buoy was subsequently picked up adrift in the Bay of Fundy and towed into Portland by the U. S. tender "Lilac," and brought to Halifax by the schooner "Gasper Ambre."

Several new buoys have been added to the list of coast buoys during the past year and have proved very useful.

The following is a list of casualties, additions, etc. :

Outer Automatic

Carried away by ice in April. Picked up by "Newfield," April 25th, two miles south of Betty's Island light, with loss of stone.

Sambro Automatic.

A new buoy and moorings placed on December 5th, 1893, for winter service was noticed on December 29th to have disappeared. No trace has been found of it, and it is supposed to have been run into and sunk. A new buoy was placed which was carried away by ice in April. Subsequently picked up in Bay of Fundy and towed into Portland, Maine, by U. S. tender "Lilac" and brought to Halifax, moorings lost.

Reported adrift by keeper of Betty's Island light November 6th, government steamer "Acadia" subsequently reported having passed the buoy adrift about four miles west of its position. Not since recovered.

Egg Island Automatic.

Carried away by ice in April. Picked up by "Newfield," 15 miles south of Sambro, with loss of stone only.

Isaac Harbour Automatic.

Government steamer "Acadia" reported passed buoy adrift off Indian Harbour on the 12th November, 1894. Not since recovered.

Sisters Bell Buoy.

Carried away by ice in April. Picked up by steamer "Bridgewater" about 15 miles west of Sambro and towed into Moser's Harbour, La Have. Subsequently brought home by "Newfield." Stone and chain lost.

Canso Automatic.

On January 7th, 1894, the "Newfield" discovered that the buoy had disappeared; as no trace of it has since been found, it had probably been run into and sunk by some vessel.

Port Medway Bell Buoy.

During the heavy winter storms this buoy was capsized, and the cage lost; since replaced.

Brazil Rock Bell Buoy.

Reported adrift and picked up by the "Newfield" on September 26th with loss of 25 fathoms chain and stone. The buoy had been towed towards land by fishermen who were paid \$20 for their services.

Blonde Rock.

Picked up adrift by schooner "A. C. Goreham" and towed to Wood's Harbour. Subsequently brought home by "Newfield" with loss of chain and stone. Salvage claim after some delay has been settled at \$50 for the schooner and \$10 for each of the crew of twelve men.

ADDITIONAL BUOYS AND CHANGES.

WHISTLING BUOYS OFF YARMOUTH.

Cape Fourchu.

Five miles N. W. by W. from Cape Fourchu Light in 22 fathoms water. Painted red.

Yarmouth Fairway.

Ten miles S. W. by W. $\frac{1}{2}$ W. from Cape Fourchu Light in 34 fathoms water. Painted black and white in stripes.

The above two automatic buoys were moored by the "Newfield" on Dec. 25th, 1893, and have proved of great advantage to vessels, and especially to steamers seeking the entrance to Yarmouth Harbour during thick weather.

Cape Breaker Bell Buoy.

A Trinity bell buoy was moored on the 1st day of June last, 4 miles E. S. E. from the middle of the shoal, in 14 fathoms water, both for the purpose of indicating the position of the shoal and to act as a fairway buoy for vessels seeking Canso Harbour from the southward in thick weather. This buoy has proved very useful.

Tom Cod.

An iron can buoy has been placed to mark this dangerous shoal, which lies to the southward of Green Island, Country Harbour, Guysboro' County.

HALIFAX HARBOUR.

Hen and Chickens.

A spar buoy, painted red, has been moored off the Hen and Chickens Shoal, which is dangerous to vessels going in or out of the N. W. arm.

Meagher's Beach.

An iron can buoy will be placed this month off the lighthouse shoal, which extends in a southerly direction from the lighthouse.

Lurcher Shoal.

The colour of this buoy has been changed from red to red and black horizontal stripes with the letter **L**. Painted in white on the sides to prevent any confusion between it and the Cape Fourchu whistling buoy.

SABLE ISLAND.

All the stations throughout the island were inspected by the Superintendent of Lights on the 13th June, and found to be in good order. Mr. James Mackay, foreman, and three carpenters were sent to the island in May last to carry out authorized improvements. The following work has been performed by them :

East End.

Barn.—Building raised one foot, one side of roof reshingled, walls reboarded and battened, new sills, floor and doors, stalls refitted.

Oil House.—A new oil store was built, as the old one was found to be not worth repairing.

No. 4 Station.

Sailor's Home.—Porch raised and shingled.

Horse Stable.—One side of roof reshingled.

Boat-house.—Boat-house raised 3 feet 6 inches, and a new tramway built to run out boats to the beach. Minor repairs made to building.

No. 3 Station.

Horse Stable.—Roof shingled, one new sill, one end reboarded and battened, part new floored level of scaffold raised and stalls refitted.

Cattle Barn.—Shed roof raised, entire roof shingled, and ends of shed made good to roof.

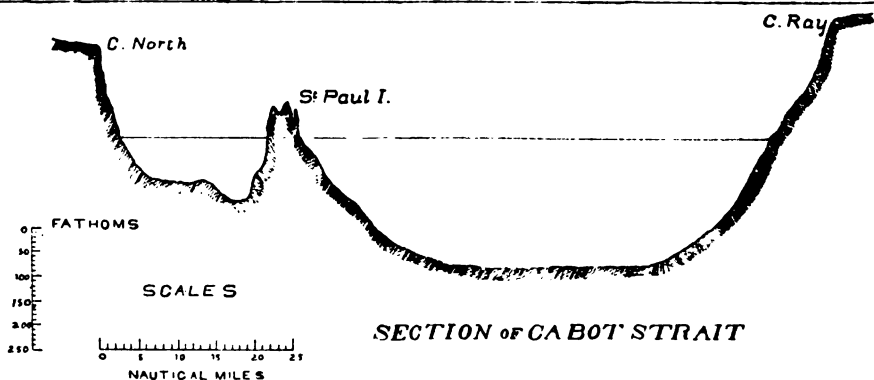
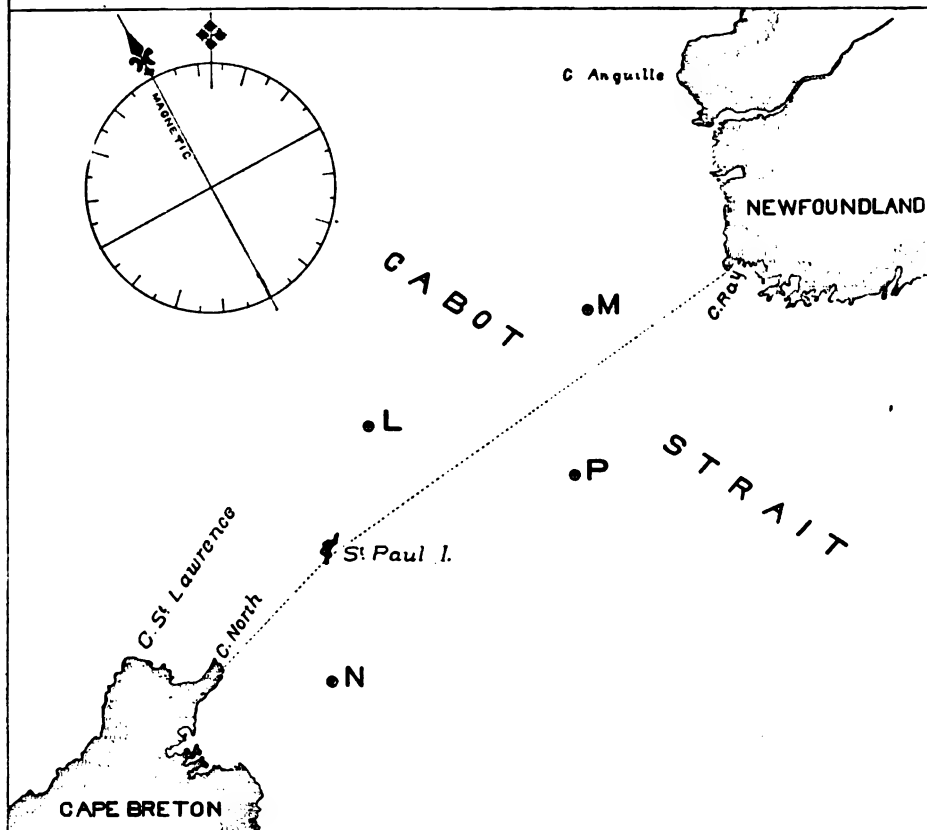
New Dwelling-house.—A new dwelling house has been built on a new site near the old one. The size is 22 x 28 feet, with kitchen and shed 14 x 24 feet.

SOUTH-EASTERN ENTRANCE TO THE GULF OF ST LAWRENCE

CABOT STRAIT

SHOWING STATIONS OCCUPIED IN SURVEY OF CURRENTS

SEASON OF 1894.



Main Station.—Minor repairs done to buildings.

Pony Shelters.—Two shelter sheds constructed between No. 1 and 2 stations.

The following is a list of vessels wrecked and stranded, as far as known, during the past year :

January 12th. American schooner "Robert J. Edwards," of Gloucester, Bibber, master, with frozen herring from Newfoundland, struck on north side in a hurricane and became a total loss. The crew, seven all told, were drowned.

May 27th. SS. "Laleham" of Newcastle, Scrivener, master, via Halifax for Havre, with cattle, struck north side near No. 1 station during a dense fog at 3.15 a.m. Assistance was rendered by staff in carrying out kedge anchors, and ship was hauled off at high tide and proceeded.

July 30th. Barque "Nicosia," of St. John, N.B., Cole, master, from Dublin, for St. John, in ballast, struck on south side at 5 p.m., during a dense fog. All hands got ashore safely in ship's boats and were subsequently brought to Halifax in the "Newfield." A quantity of sails and gear was saved from the wreck, brought to Halifax and sold at public auction. The account sales has been forwarded to Ottawa.

September 11th. SS. "Nerito," from end of Sunderland for Hampton Roads, William Skipper, master, struck on the south side of end of N. E. dry bar at 6.30 a.m., during a dense fog. The island life boat and rocket apparatus were despatched to the scene, but their services were not then required. As there appeared to be some chance of getting the ship off, the officers and crew remained by her. The government steamer "Aberdeen" was sent to the island on the 18th September, to render any assistance possible. Capt. Knowlton, finding that he could not approach within a half mile of the stranded ship did not make any attempt to haul her off. He offered to bring Capt. Skipper and crew to Halifax, but they declined to abandon the ship without making further efforts to get her off. A number of the ship's boats and apparel were brought off by the "Newfield" and are stored on the M. and F. wharf here until the fate of the "Nerito" is decided. On the 21st September, the captain abandoned the ship, as the sea on the previous day had driven her high on the bar. The captain and crew were brought off by the steamer "Lunenburg," Mr. Roche the ship's agent here having sent her out to attempt to haul the "Nerito" off. The Merritt's wrecking organization of New York applied for and obtained permission to send appliances to the island to attempt to float the "Nerito" or, failing that, to wreck her and perform salvage. The result of their efforts has not yet transpired.

Wild Horses.

The "Newfield" brought off in August, 51 wild horses, which were sold at public auction, realizing \$738.80 as per account sales previously forwarded. It was intended to bring off another lot later on, but bad weather prevented the shipment being made.

Crunberries.

Ten barrels have been brought off and sold and a balance of about 20 brls. now awaits shipment. These represent the crop of this year, which although larger than that of the two previous years, is still much below the average.

St. Paul's Island.

Mr. Samuel Campbell, the late superintendent was suspended on the 9th Nov., 1893, and Mr. Robert Muirhead, engineer of fog-alarm station, placed in temporary charge. On the 23rd Nov., 1893, word was received that Mr. Muirhead had shot himself dead. Mr. John Campbell was subsequently appointed acting superintendent and Mr. Henry Kerr was sent to the island to take charge of the fog-alarm. The superintendent of lights made an official inquiry into the circumstances attending the death of Mr. Muirhead on the 31st July last, and in his report to the department expressed the opinion, based on information obtained at the investigation and his personal knowledge of Mr. Muirhead's temperament, that he had committed suicide while labouring under a temporary fit of insanity or despondency. This opinion was concurred in by Mr. Muirhead's family and members of the staff.

By Order in Council of the 5th October, Mr. John McLeod, of Big Bank, Victoria County, C.B., was appointed temporarily at a salary of \$500 per annum, as superintendent of the humane establishment and engineer of the fog-alarm, with authority to employ five men, approved of by the agent or superintendent of lights, as light keepers and assistants in keeping the fog-alarm, and to act as boatmen in saving life, at \$300 per annum each. On the 27th September, Mr. McLeod, with two assistants, was installed on the island, and Mr. John Campbell, the acting superintendent, brought off and landed at Baddeck on the following day. Mr. Kerr was left at the fog-alarm for the purpose of instructing Mr. McLeod in the use of the machinery, but will be brought off by the steamer "Harlaw" on her next return trip from Newfoundland.

The authorised extension of the late engineer's dwelling being rendered unnecessary by his death, that work has accordingly not been undertaken. In consequence of the unsettled state of affairs on the island, the work of rebuilding the boat slip at the N.E. light station had to be deferred until next year.

The island was inspected throughout on the 31st July last by the superintendent of lights.

LIFE BOAT STATIONS.

All the life boat stations throughout this division were inspected by Mr. Alfred Ogden, who reports directly to the department at Ottawa.

FOG-ALARMS.

Cape Race.

Built a new bulk head around reservoir and repaired inside. Repaired derrick and built new launchways for boat. Two reservoirs caulked. Recording gauge repaired. Two lengths smokestack supplied, and a new stove. Set furnace bars and iron wheelbarrow furnished, one pop safety valve, one new steam gauge and injector supplied.

Cranberry Head.

New flange and nipple to boiler, one ring for piston, one two inch union coupling, and three new reeds supplied. Also zinc blocks for boiler.

Scattarie.

Two check valves supplied.

Cranberry Island.

One tube expander, two wrenches and four gauge glasses supplied.

Cross Island.

New try cock to boiler and nipple for surface blow, operating valve faced up and levers adjusted. One trip lever, reed box repaired.

Cape Roseway.

New reed box, two Stillson wrenches, six tube rods and eight set screws supplied.

Seal Island.

The boiler has been covered with asbestos cement, and eight patches put on bottom.

Brier Island.

The boiler has been covered with Asbestos' cement, and lubricator supplied.

Point Prim.

One boiler (left hand) re-tubed and caulked, three globe valves supplied. Building painted.

Cape d'Or.

A new coal shed has been erected at the landing in Horse-shoe Cove, and an inspirator fitted to boiler. Twenty feet new suction hose supplied, and coal shed at fog-alarm repaired.

NEW BRUNSWICK LIGHTHOUSE DIVISION.

This division comprises all the lighthouses and other aids to navigation within the boundaries of this province, both on the Bay of Fundy and on the Gulf St. Lawrence side. The large buoys maintained by the government on the Nova Scotia coast of the Bay of Fundy are also attended to by the steamer "Lansdowne" under the direction of the New Brunswick agent but are otherwise under the control of the Nova Scotia agent.

Mr. J. H. Harding is agent of the department at St. John and there are in the agency 94 lighthouses and 3 steam fog-alarms attended to by 88 lightkeepers and 12 engineers in charge of both lighthouses and fog-alarms, having with them 10 assistants making in all 113 employees in the agency.

REPAIRS TO EXISTING STATIONS.

Anderson's Hollow Light.

A new window was placed in the tower to increase the arc over which the light is visible.

Bearer Harbour Light.

A new boat was built for this station by Mr. John Woodley which cost \$48.36. A set of new copper lamps was supplied at a cost of \$25.88.

Bliss Island Light.

The lighthouse and outbuildings received two good coats of paint; and the fences all whitewashed. The keeper built a small boathouse for keeping his boat in. Two sills were placed under the oil shed by the keeper.

Big Duck Island Fog-alarm.

The keeper built a porch 10 feet long 7 feet wide. The dwelling-house, engine house and outhouses were painted with two coats of paint. A new coal derrick and two reservoirs were built by Mr. Ross, carpenter of the steamer "Lansdowne." The boiler received a new set of tubes.

The tubes in this boiler only last about four months, owing to acid in the water. A new boiler is required at this station, and copper tubes are recommended.

Cape Spencer Light.

The lighthouse has been painted inside. The keeper cleared up one-half acre of land. The sum of \$75 was authorized to be expended on the main road to the end of the road on the lighthouse property. The road has been repaired under the direction of the lighthouse keeper. An annual allowance of \$10 has been granted towards keeping the main road in good order.

Clifton Lighthouse.

The keeper painted inside and outside top of lantern; also made some repairs to the covering of lanterns. The name of this light has officially been changed to "Stonehaven," because Clifton post office is some distance from the lighthouse, and a new post office called Stonehaven has been established in its vicinity, and it was found that the use of the old name led to confusion.

Escuminac Light and Alarm.

The buildings were painted and whitewashed by the keeper, also a new floor laid. The well in connection with the dwelling-house was repaired and a new fence erected by the keeper.

Fanjoy's Point Light.

A plan and description of the land required was made by Mr. Starkey and forwarded to Ottawa; it being the intention of the department to expropriate the quantity measured off for lighthouse purposes.

Gannet Rock.

On or about the 10th November, 1894, it is proposed to discontinue the fog gun heretofore fired every hour at Gannet Rock light station, and replace it by a cotton powder cartridge exploded every twenty minutes.

The new signal will be fired from a derrick erected near, and on the seaward face of the lighthouse. The reports of the explosions should be sharper than those from the gun previously fired.

Until the supply of gunpowder at the station is exhausted the gun may occasionally be fired instead of the cartridges, but when used the intervals will be twenty minutes instead of one hour, as formerly.

Grindstone Island Light.

The buildings have been all painted; the outbuildings and underpinning of the house and lighthouse whitewashed. A new pipe to bring the water from the old tank to the new engine house was put down. The fences were whitewashed; and a new plank side walk from house to lighthouse, engine house and outbuildings was laid.

Goose Lake Light.

New copper lamps were supplied to this station at a cost of \$16.55. The sum of \$5 was paid to William Marks for surveying the Government land.

Grand Manan Fog-alarm.

A new set of tubes was put in the boiler. The water tank was repaired by Mr. George Griffin at a cost of \$11.25. The following labour was performed by the keeper in repairing and cleaning, viz. :—

Painted dwelling house and whitewashed wood house; repaired roof of the same. Repaired walk around dwelling house. Repaired road to coal sluice. Repaired walk leading to fog alarm building. Whitewashed fog alarm building inside; painted all doors, windows and shutters. Painted boilers, engines and all pipes. Whitewashed coal shed and small building connected. Repaired roof of coal shed. Laid part of the floor in whistle house with new boards. Painted railings around dwelling house, also railings that lead to fog alarm building. Repaired water pipe in the field with cement.

Extensive repairs were made at this station by Messrs. D. W. Clark & Sons, of Carleton, at a cost of \$825.59. The work comprised securing the sluice which carries the coal from the top of the hill to the coal shed, taking down the old coal shed and

removing the top of the foundation ; building a new cribwork around the whole of the foundation of the coal shed and raising it 3 feet higher than the old one ; running three tiers of the top timbers over the old foundation embodying it with the foundation of the whistle house, and building on this foundation a coal shed 26 feet long by 16 feet wide with 14 feet posts ; building a passage way between the coal shed and whistle house 10 feet long, removing the earth from around the sills of the whistle house, and placing new sills under the two sides of the building with a plank platform all around the building to keep the earth from the sills ; the clapboarding was repaired and new sills put under the dwelling house, and a new platform laid on the south side of the dwelling.

It is reported that further repairs will be required to the whistling house within a few years, and also extensive repairs to one of the water tanks.

Head Harbour Light and Fog-alarm.

The lighthouse has been painted by the keeper. The coal shed in connection with the fog-alarm was sheathed, and the building painted inside and out. The out-buildings were all repaired and whitewashed.

Le Tête Fog-alarm.

During the months of July and August the roof of the buildings were given two coats of fire-proof paint ; and the outbuildings were whitewashed.

The southern side of the engine house is exposed to salt spray and storms which take off the paint faster than on other parts of the building ; and on this account it was given a coat of paint in September. All the other parts of the buildings are painted and will not require painting during the summer of 1895.

In October a new platform and doorstep were built in connection with the dwelling which is a decided improvement to the approach to the house, both in looks and usefulness. During the same month a new stone wall was erected under the kitchen at a cost to the department, for labour of \$10.00. This also is a very great improvement to the dwelling and one that was much needed.

The boilers were cleaned and tested at different times ; and a tube in the main boiler that was found to be bad was plugged.

Lightship "Jennie."

The repairs to the lightship were performed by tender in accordance with the following specification :—

Specification.

Caulking.—Deck to be caulked fore and aft, and the bottom of the vessel thoroughly overhauled and caulked where requiring it, and all carefully payed with good pick.

Scraping and cleaning.—All surfaces of the pick payed seams old paint, where blistered or otherwise unfit to receive paint to be properly scraped and cleaned.

Painting.—The vessel to be painted from the water line to rail inclusive, two good coats, the same colour as last painted; also all the bottom from the water line with one good coat of best copper paint. Bulwarks and all the deck work, houses and portions which have been painted to receive two coats, same colour as before.

Rigging.—The rigging to be tarred with Stockholm or other approved tar.

Anchor Stock.—One anchor to be supplied with stock.

Lanterns.—Four lanterns to be properly repaired.

The whole work to be done under the inspection and to the satisfaction of the keeper.

The contractor to supply all materials and labour.

Tenders were received from the following:—

R. R. Call, \$195.00. John Robertson, jr., \$200.00. M. Bannon, \$235.00. John Ferguson, \$240.00.

Mr. R. R. Call's tender being the lowest was accepted, and the work was performed in a satisfactory manner.

Machias Seal Island Light and Alarm.

A new set of tubes was placed in the boiler and general repairs were made to the machinery and boiler. The lighthouses have been painted, the sum of \$50.00 being allowed by the department for this purpose.

The tramway used for conveying fuel into the coal shed was repaired by contract by D. W. Clark & Sons of Carleton, at a cost of \$250.00, from the boat-house to the coal shed. As the men were on the island the keeper had the remainder of the tramway repaired from boat-house to low water mark at a cost of \$25.50.

Miscou Light and Alarm.

Mr. John Heron's offer to supply 25 cords of wood at \$3.00 per cord was accepted by the department. A new revolving machine was placed in the lighthouse last spring, and the character of the light changed from a fixed to a revolving light.

Musquash Island Light.

A new lighthouse tower was erected at this place by Mr. John A. Jones at a cost of \$337.50.

Middle Island Light.

A small building $19 \times 12\frac{1}{2}$ was built at this station by the keeper during the year. The keeper reports that it cost \$50.34. The department authorized expenditure of \$14.00.

Negro Town Point Light.

Repairs were made to the tower at a cost of \$16.00. The sum of \$10.50 was paid for labour assisting the keeper painting the light.

Neguac Gully.

The front beacon light at this station has been discontinued, as, in consequence of change in the channel, it could no longer be made to indicate a safe passage over the bar. The main or back light is still maintained as a coast light and to indicate the position of the gully.

Partridge Island Fog-alarm.

Fitted up a smoke pipe or flue between the smoke box of the west boiler and brick chimney, also repaired the geared operating wheel—this is the gear that operates the alarm. The boilers were painted this spring.

Portage Island Light.

A new boat was built by Edward Thibodeau for this station at a cost of \$45.

Point Lepreaux Light and Fog-alarm.

The road leading to government landing at Thomson's Cove was repaired. A new plank walk around the dwelling-house and to the lighthouse was built by the keeper. A new signal mast for code of signals was erected. A set of new tubes was put in the boiler. Several new pieces of machinery were obtained from the Truro foundry Co., at a cost of \$75.65, and were placed in position by the engineer and his son.

Passamaquoddy Bay Light.

Both landings were repaired, all the stone ballast being removed. A large portion of the old platform was removed and relaid with new deals. The inside of the building was painted and the block and coal shed whitewashed.

Quaco.

The lighthouse, fog-alarm building and oil house have been painted and all other buildings whitewashed. The boiler was repaired and a new set of tubes put in.

South Tracadie Light.

Repairs were made during the year by Mr. William Ferguson, at a cost of \$111.50.

Sparrow Tail Light.

The landing and platform were repaired. New steps were erected over the cliff by Mr. Ross, with the assistance of the keeper. A new plank walk was built to the lighthouse. The lighthouse, dwelling and flag staff were painted.

St. Andrew's Light.

The following repairs were made during the year :—

Middle section of the wharf was repaired from the beach to top. South east side was respiled. Main house and kitchen straightened up and new platform laid. Two sills were placed under pantry. Porch at kitchen door rebuilt. Gutters on house repaired and steps made for lighthouse and dwelling and porch.

Spruce Point Light.

A new abutment was built at this station and new sills placed under the lighthouse ; also a new platform laid, at a cost of \$30.

Southern Wolf Light.

All the repairs required were made by the keeper. A survey and plan of the land occupied for lighthouse purposes was made at a cost of \$36.95.

Sheldrake Island Light.

A new floor was laid in the east beacon light ; and the ladder and roof repaired.

Tracadie Gully Light.

The following changes were made at this station during the years 1893-94, viz. :—

The main lighthouse tower and beacon light were removed from the north side of the gully, and put in range with the outer entrance over the bar ; but owing to the shifting of the channel it was necessary to do away with the beacon light, in range with the tower light on the south side of the gully, and place white lights in range with the channel at the outside entrance, on the north side of the gully, on a narrow strip of grass beach. The main light in the south side being still maintained as a coast light. The work was performed by Mr. J. R. Young, at a cost of \$25.

The front light of the new range, which was put in operation on the 29th August, 1894, is fixed white, shown from a lantern hoisted on a pole, having a small shed at its base painted white. The height from the ground to the light is 20 feet. The light is elevated 25 feet above high water mark and should be visible 6 miles.

The back light stands 55 feet N. N. W., from the front one, and is also fixed white, shown from a lantern hoisted on a pole, with a small shed at the base painted white. Its height from the ground is 30 feet. It is elevated 35 feet above high water mark and should be visible 7 miles.

Both lights should be seen in clear weather between the bearings of S. W. round through N. to N. N. E.

Vessels entering the gully should bring the two lights in range, and steer N. N. W. until near the third red buoy, or until the main lighthouse tower on the south side of the Gully bears W. S. W. ; then head for that light and after passing it, leaving it on the port hand, they will be in the main channel, inside the south beach, and out of danger.

William's Landing Light.

The mast near the outer end of the public wharf, from which the light was exhibited was carried away by the spring freshet. It was later placed further back, 139 feet from the outer end of the wharf, and notice to mariners issued. A temporary light was exhibited during the time the repairs were being made.

PRINCE EDWARD ISLAND DIVISION.

This division is under the charge of Mr. Artemas Lord, provincial agent of the department, stationed at Charlottetown, who has under his supervision Mr. Milton Walsh, foreman of works of general repairs.

In it there are 55 lights and 35 stations and 1 steam fog horn, under the charge of 41 keepers. There are three automatic whistling buoys and one bell buoy in this agency. The majority of the lights are situated on headlands and serve the general purposes of navigation, the remainder being harbour lights intended particularly for the benefit of fishermen. Thirty-five harbours in this province are buoyed by the department under contract; the buoys being under the general supervision of the agent.

The lights were as usual inspected during the summer season by the agent in the government steamer "Prince Edward" which also delivered the lighthouse supplies. The agent reports the stations as generally being in satisfactory condition, but considers that they should be inspected at certain intervals during the year.

NEW AIDS TO NAVIGATION.

Additional Range Lights in Crapaud Harbour.

Three range lights, in addition to the two previously maintained in Crapaud Harbour, were put in operation on the 15th June, 1894.

1. One of these lights is located on the south side of Paul Bluff, west of the dredged cut from the road or anchorage to the wharfs.

The light is a fixed red catoptric light, shown from a lantern hoisted on a mast. It is elevated about 30 feet above high water mark, and should be visible about three miles over a small arc on each side of the line of range. The mast rises from a square tower with a shed roof, and at the top of the mast is a triangular slatted beacon, the whole painted white.

2. Another light to be used as the back light of a range in conjunction with that above described, the two lights together to be known as "Wright's Range," is located on Mr. Charles L. Wright's farm, 150 feet south of his dwelling house in the corner of an orchard. It is distant about $3\frac{1}{2}$ cables N.W. $\frac{1}{4}$ N. from the front light on Paul Bluff. It is a fixed red catoptric light, elevated about 50 feet above high water mark, and should be visible three miles over a small arc on each side of the line of range.

The building is a square open framed wooden tower with the side facing the line of range, slatted, painted white, and surmounted by a lantern painted red. The height of the building from the ground to the top of the lantern is about 27 feet.

3. The third light is located on Palmer's wharf in such a position that, in range with the front light of the old range standing near the north end of the bridge, it leads to the black buoy at the entrance to the dredged cut between the road and the wharfs, and through the dredged cut on a N.N.E. course.

It is a fixed red catoptric light, shown from a lantern attached to a post at an elevation of 10 feet above high water mark, and should be visible two miles in the line of range.

To enter Crapaud Harbour from the Strait of Northumberland, vessels should bring the two old lights (which will be known hereafter as "Leard's range," and which are both fixed white) into alignment and keep them in one on a north course until the lights of Wright's range are in alignment when they should follow this range N.W. $\frac{1}{4}$ N. until

the red light on Palmer's wharf is in alignment with the front light on Leard's range. These two in one will lead in from the black buoy at the entrance to the dredged cut, through the cut, to the wharfs, N.N.E., but strangers entering at night are advised to anchor in the road at this last described turning point near the black buoy, as they will be in good anchorage inside the shelter of Tryon shoals, while it is not safe to attempt the dredged cut at night.

These lights were established under the agent's special supervision and the expenditure in connection with their establishment amounted to \$61.78.

North Cape Whistling Buoy.

A whistling buoy has been moored in 9 fathoms, 2 miles N. E. by N. from North Cape lighthouse, at the north extremity of Prince Edward Island.

This buoy is a first class Courtney automatic whistling buoy, of the usual conical pattern, painted red, with "North Cape Reef" in white letters. It is surmounted by a 10-inch whistle, which will be operated by the motion of the buoy on the waves.

REPAIRS AND IMPROVEMENTS IN EXISTING STATIONS.

Sea Cowhead.

Lantern scraped inside and thoroughly painted and overhauled, new chimney in cottage kitchen, winter storm sashes fitted on seven windows, and all the cottage windows reputted. Cost \$49.92.

Indian Point.

In consequence of the shrinking and splitting of the sheathing, the whole of the lower section of the light building was stripped of battens and full coated with tarred felt and shingled with XXX cedar shingle. The whole tower received two coats of paint. Storm sashes were put on all the tower windows. North end of breakwater close piled and timber filled in. Iron clamps put on corner to bind securely. Brush and stone filled up between iron caissons and breakwater, and the station put in good order by H. P. Woods under contract. Cost \$320. Department providing the paint and oil.

The lantern was thoroughly scraped and painted inside, under the superintendence of the lightkeeper.

Miminegash Inner Range.

The foundation posts were re-set and the span under the foundation filled with brush, clay and stone. Work done by W. P. Callaghan, keeper. Cost \$13.

Miminegash Outer Range.

The sand hill upon which this light is placed, was badly cut out by gales, and brush and beach gravel were put in to fill up and stop the cutting out, work done by keeper Norbert Casey. Cost \$5.

North Cape.

The revolving gear being out of order, the whole box was taken by rail to the department workshop, winter 1893-94, and thoroughly overhauled by Mr. Walsh. The lower end of shaft was re-turned and re-pointed by Messrs. McKinnon and McLean, who also cast and fitted upon the chain barrel a new cog-wheel. McKinnon & McLean's charges were \$24.12 The cottage chimney was repaired. Total cost \$39.77.

Tignish.

The light building received two coats of paint and overhaul of lantern deck. Cost of labour painting and carpenter repairs to tower \$19.90.

Sandy Island.

At this station sundry small carpenter repairs were done. Tower and cottage painted. Costing for labour \$22.00.

In consequence of a serious break in the brush work defence at sea edge of island, tenders were called, and the contract was awarded to J. P. Cunningham to repair the damage at a cost of \$169.00. Cost of local inspection of work under contract \$14.00, making a total expenditure for station repairs \$205.00.

Little Channel.

In consequence of change in channel, the front range was moved.

Darnley Range.

The Columbia burners at first used at this station were changed last season to mammoth flat wick burners by Mr. Walsh.

Fish Island.

In consequence of a sand spilt making out from the Darnley shore north, the front range was moved to suit best water. Work done by Mr. Alex. Thomson, harbour master for Malpeque at a cost of \$30.00.

New London.

In consequence of the breaking of a chimney in the main tower lantern, the lamps caught fire and before the keeper, who was asleep in the light room just below the lantern, could get the flames put out, the whole gear was destroyed. The tower was saved from total destruction, by the brave and energetic action of the keeper, Captain George McKenzie, who entered the lantern, all aflame with burning oil, and succeeded, unaided, in getting the fire out.

Mr. Walsh has put in a complete new set of gear. The lantern was scraped clean and painted by P. McMahon. Cost for labour and board, \$6.30.

North Rustico.

At this station small repairs to the platform and kitchen chimney have been made. Cost \$11.12.

Corehead Range.

In consequence of a petition from the fishermen of this harbour, the back range tower situated on Black Point, was removed to the beach. A new block was built to receive the front range, also a quantity of brush and stone was subsequently added. The lights were both established upon the beach on the west side of the harbour. Cost of change, \$85.84.

Tracadie.

The tower from which the inner or back range light at Tracadie was exhibited, at the western entrance to Tracadie Bay, on the north or Gulf of St. Lawrence coast of Prince Edward Island, has been replaced by a new tower, from which the light was shown on the opening of navigation in 1894.

The new tower is a square wooden building painted white. The upper portion of the tapering building forms the lantern. The height from the ground to the top of the ventilator is 28 feet.

The light is a fixed red, catoptric, light. It is elevated 32 feet above high water mark, and should be visible in the line of range and up the coast in a north-westerly direction, 8 miles.

The tower stands on the gravel beach, near the site of the old one which it replaces, 1,200 feet S. S. W. from the front range light, but this course and distance are liable to be changed at any time without notice to make the alignment suit the changes in the shifting channel.

This work was done under contract by Mr. James Hendrahan for the sum of \$220.

The old tower was offered at public auction, the highest bid being \$4.50, it was withdrawn from sale and was subsequently sold to the keeper for the sum of \$8, the plate glass window being kept by the department.

Wood Island.

Chimney taken down to the roof and rebuilt; a new post and rail fence erected, and the whole tower and cottage painted two coats, at a cost of (less paint and oil) \$73.44, part of this cost will appear in accounts for 1894-95.

Cape Bear.

A new barrel and cog-wheel for the clock-work machine were supplied by Messrs. Chanteloup. The roof of cottage was shingled, the wood shed enlarged, and sundry other carpenter repairs done, the total cost of repair, \$73.16.

Georgetown.

The site and right of way at the inner range light were acquired at a cost of \$150.

East Point.

The fog-alarm was supplied with span tubes and other engineer's supplies, in case of accident to machinery. The machinery was overhauled and two new tubes put in by the assistant keeper, Mr. Bugi.

The well supplying this station not giving satisfaction, well diggers were employed and well cleaned out, the bored part was also cleaned, and the supply again became of sufficient volume for use of station.

Small repairs were done to the light gear. Total expenditure for repairs, \$48.05.

Souris East.

The mast and hut on the end of the Souris breakwater were carried away during the same gale which took out of the middle of the breakwater about 200 feet in length. The cost of repairs, erecting mast, &c., was \$48.34.

The lantern being totally destroyed, Mr. Walsh made a new one. The light in the meantime being kept up (as soon as the mast could be erected and stayed) by a cast glass lens lantern.

The windows and doors in the cottage attached to the main tower were overhauled and repaired at a cost of \$7.

In consequence of the break in the breakwater, the keeper had to be supplied with a new boat, which was built by Mr. J. S. Rogers for the sum of \$22.50. Total expenditure at this station, \$80.

BRITISH COLUMBIA LIGHTHOUSE DIVISION.

This division comprises all Canadian waters on the Pacific coast and is under the charge of Captain James Gaudin, agent of the department at Victoria, who also acts as inspector of lights.

There are in this province 13 light stations, five of which are fog-alarms, and at three others bells rung by machinery. There are also two lantern lights on pile beacons in Victoria Harbour and a similar beacon light and a lighted buoy in Nanaimo Harbour. The above are in charge of 15 lightkeepers, some of which supply assistance out of the salaries allowed.

The lights were supplied and buoys tended during the past season by the Dominion steamer "Quadra" Captain J. D. Walbran, master.

NEW AIDS TO NAVIGATION AND IMPROVEMENTS IN EXISTING AIDS.

Entrance Island.

The erection of a fog-alarm building at this station was satisfactorily completed by the contractor on the conditions explained in last year's report and the steam fog-horn was put in operation on the 8th September last.

The horn is operated by steam and compressed air and gives blasts of 8 seconds' duration, with intervals of 45 seconds between them. The machinery is in duplicate, so that in the event of one horn or boiler becoming inoperative the other may be put in operation.

The fog-alarm building is a square wooden building painted white, with a brown roof, and stands close eastward of the lighthouse. The horns face N. E. and are elevated about 20 feet above high water mark. A water tank house of wood, painted white, stands behind the fog-alarm building.

The expenditure in connection with the establishment of this fog-alarm has been \$5,135.99.

Victoria Harbour.

The two platform buoys in Victoria Harbour from which beacon lights were shown viz., on outer end of the spit off Shoal Point and on Pin Rock were removed last year and their place taken by a dolphin or beacon formed of a cluster of three piles. The lantern heretofore attached to the frame work of the superstructure of the buoy is now maintained on the top of the beacons and it is expected that in consequence of the great stability of the beacons, the lights will be more reliable than when they were on buoys. The Shoal Point dolphin is painted red and the light is fixed red. The Pin Rock dolphin is painted black and the light is a fixed white.

PRINCIPAL REPAIRS AT EXISTING STATIONS.

Cape Beale.

The revolving apparatus gave some trouble after being renewed ; it was attended to by the engineer of the "Quadra" last November, and has worked satisfactorily since. Some slight repairs were performed last spring, the tower dwelling and outbuildings were repainted, the fence surrounding the dwelling, which was blown down last winter, was replaced, and the Bamfield Creek trail received the annual clearing of brush and fallen trees.

Carmanah.

The trees menacing the safety of the lighthouse were cut down last autumn. A safe landing was made by removing boulders by the crew of the "Quadra. The whole of the buildings have received a new coat of paint, and new rails have been laid on the tramway.

Race Rocks.

The duplicate boiler has been connected to the engine at a cost of \$325. A new boat-house has been built to replace the old one which was blown to pieces last winter, the old worm eaten boatways have been replaced by new ones. A new boat has been supplied at a cost of \$128, to replace one stolen last November.

Fisgard.

The roof of the dwelling and the plaster in the hall way have been renewed at a cost of \$50. A new coal shed was also built last autumn.

Discovery Island.

Storm windows have been put in, leaks on the upper part of the tower have been stopped. The whole of the buildings have been painted, new boatways have been laid down.

Active Pass.

The fog-alarm at this station, operated since the 15th October last, is pronounced of great service to mariners navigating the Gulf of Georgia. Beyond the cost of repairing the supply tank, \$120, no expenditure has been incurred.

Point Atkinson.

An additional room has been built for the accommodation of the keeper. A new oil store has also been built to replace the old one which had become quite rotten. The cost of both buildings is \$325.

Brockton Point.

A new boat-house has been allowed at a cost of \$45.

Entrance Island.

The roof of the dwelling has been newly shingled ; the windows of the tower reflashed and made weather proof, and a portion of the interior has been newly plastered, the whole is now in good order. This work was done by contract.

BEACONS AND BUOYS.

Victoria Harbour.

A cluster of three piles in each has replaced the Nos. 1 and 3 buoys on which lights are exhibited, as detailed above. A new boat and boat-house has been supplied at a cost of \$120. All the harbour buoys have been relieved and newly painted.

Nanaimo Harbour.

A cluster of three piles has replaced the middle ground buoy. An attempt was made by the "Quadra" to erect a cluster off Gallows point; but owing to the rocky nature of the bottom, it proved unsuccessful. The harbour buoys have all been repainted and overhauled.

Brothie Ledge.

The wreck of the SS. "San Pedro" still lies stranded on this ledge, after numerous attempts to float her. No action has been taken by the owners to have her removed since the failure to raise her last autumn.

Zero Rock Beacon.

A stone masonry beacon painted black 13 feet in diameter at the base, and 9 feet at the top rising 13 feet above high water; from the middle of the stone work rises a wooden mast 15 feet high to which is attached open slat work in the form of a triangle point upwards, built by the crew of the "Quadra," at a cost of \$325.

Kelp Reef Beacon.

This useful aid to navigation has resisted last winter's gales, without any injury whatever.

Fraser River Buoys.

This portion of the service is performed by the snagboat "Samson." An expense of \$100 has been incurred in salving the buoys (4 in number) which drifted northward in the Gulf of Georgia, during the floods in June last. All the buoys have been picked up.

Sturgeon Bank Beacons.

These useful aids to navigation are in a good state of preservation and have stood last winter's gales without moving. A new fine pile beacon is about to be established near the mouth of the old south channel, where a spit is extending seawards.

Bell-buoy has been taken up and thoroughly cleaned and painted and remoored in the original position.

Reef Point, Cortez Island,

A new 5 feet steel can buoy has been established at this point this spring, and is greatly appreciated by navigators using this channel.

Baynes Sound, buoys and beacons, have not yet been overhauled this year; but are reported in good condition by the master of the "Quadra."

Northern buoys have received the annual overhauling, relieved where found necessary and received a new coat of paint. A new large spar-buoy has been established on Alford Reef at the entrance to Metlah-Cutlah Harbour.

BUOYS AND BEACONS.

There are about 300 harbours, bays and sections of rivers buoyed in the Dominion of Canada. In most cases contracts for a period of three years have been entered into to maintain the buoy service. In some instances the buoys are placed by the harbour masters, who furnish accounts to the department for the work done and material supplied.

The large automatic buoys maintained on the coast of Nova Scotia, New Brunswick, British Columbia and Prince Edward Island are attended to by Dominion steamers. The gas and other buoys above and below Quebec in the Quebec Agency are also maintained by government steamers, but occasionally tugs are employed when the steamers are not available. The large coast buoys maintained by the government steamers are specially referred to under the heading of each lighthouse division.

The expenditure in connection with the buoy service for the year ended 30th June, 1894, was as follows:—

For the province of Quebec, including port of Montreal.	\$21,978 05
Above Montreal, including Ontario.....	4,503 00
New Brunswick.....	6,875 60
Nova Scotia.....	9,462 47
British Columbia.....	7,050 19
Prince Edward Island.....	2,305 16
	<hr/>
	\$52,174 47

This includes the expenditure incurred in the construction of new automatic buoys.

OIL FOR THE USE OF LIGHTHOUSES.

The oil for lighthouse purposes has been purchased from the Imperial Oil Company of Petrolea, by contract, which was entered into on the 11th March, 1893, for a period of three years. Tenders were invited by public notice and the lowest tender was accepted.

The quantity of oil supplied to the lights above Montreal, by the Imperial Oil Company during the year 1894 was 23,123 $\frac{3}{4}$ gallons, imperial measure, which cost \$4,172.98; to the lights in Quebec district, 37,369 $\frac{1}{2}$ gallons which cost \$6,392.51; to the Nova Scotia district 58,963 $\frac{1}{4}$ costing \$12,968.38; to the New Brunswick district 16,762 $\frac{3}{4}$ gallons costing \$3,427.74; to the Prince Edward Island district 4,976 gallons which cost \$1,144.48, making the total quantity purchased from the Imperial Oil Company 141,195 $\frac{1}{2}$ gallons, and the total cost \$28,106.09. In addition to this the department purchased from the Standard Oil Company of New York 2,800 gallons of American oil for the New Brunswick district at a cost of \$448; for the Nova Scotia district 9,945 gallons at a cost of \$1,589.70; for the district above Montreal 1,450 gallons at a cost of \$246.50, and for the British Columbia district 8,750 gallons at a cost of \$1,662.50.

The total quantity of American oil purchased was 22,945 gallons, wine measure, costing \$3,946.20.

The list of prices according to contract with the Imperial Oil Company is as follows :—

Delivered at	Per gallon in Barrels.	Per gallon in Cases.
	Cts.	Cts.
Sarnia.....	14½	19
Hamilton.....	15½	20½
Kingston.....	16½	21
Montreal.....	16½	21½
Quebec.....	17	21½
St. John, N. B.....	17½	22
Pictou, N. S.....	18	23
Halifax.....	17½	22
Charlottetown, P. E. I.....	18	23

DOMINION STEAMERS.

"LANSDOWNE."

The ss. "Lansdowne" was employed from the 1st July, 1893, to the 30th June, 1894, during the season of navigation, in lighthouse and buoy service in the provinces of New Brunswick and Nova Scotia. Between the 8th December, 1893, and the 10th March, 1894, the vessel was in winter quarters. Repairs to the hull and machinery were found necessary and the "Lansdowne" was placed on blocks in St. John Harbour where she remained until the 14th of May undergoing repairs.

The repairs were extensive, but they resulted in giving increased speed to the steamer and making her very much tighter. The bottom was stripped of its sheathing which had been put in for Arctic service and the vessel was caulked all over and then coated with copper paint.

The planking was opened on the top sides to ascertain the condition of the timbers which on examination were found to be sound. A new wheel house was built on the bridge deck and the steering gear conducted to it. Sounding and deep sea riding apparatus was fitted on deck for tidal survey purposes and the cabins and deck were repainted.

The machinery was overhauled, the engine and boiler repaired, a new tail-shaft was made and the propeller was fitted to it.

The removal of the sheathing, plugging, smoothing and caulking was done by contract for which tenders were invited and the lowest accepted. The tail-shaft was made by contract for which tenders had also been invited and the lowest accepted. The work to the machinery was done under the superintendence of the chief engineer who obtained assistance from machinists as he required it. Part of the carpenter work was done by the carpenter of the ship with assistance from outside. These repairs were completed on the 14th May, 1894, the vessel immediately went into commission and has given far more satisfaction in her movements as a consequence of the repairs.

“NEWFIELD.”

The “Newfield” received on board during the first week of July, 1893, supplies for lighthouses on the Nova Scotia coast and on the 12th of the month left Halifax on a long circuit. When the circuit was completed the vessel returned to Halifax, where her boilers and machinery were overhauled. The cable machinery was placed on board and the “Newfield” entered upon the work of repairing the cable at St. Paul’s Island, Magdalen Islands and Anticosti on the 18th of August, for the Public Works Department. This work was completed on the 18th of September and the steamer resumed the lighthouse and buoy service.

An accident occurred to the propeller on the 13th October, while the steamer was turning in a channel near Yarmouth. The steamer was docked and it was found that three blades of the propeller were broken. A spare propeller was sent from Halifax and the steamer entered upon the usual fall work which consists of lifting and examining the automatic and other large buoys and visiting Sable Island. This steamer went out of commission for repairs during the winter months. The department supplied her with a new propeller shaft and blades of a different pattern and type from the old ones. The steamer’s speed was increased by this change and the facility for restoring propeller blades when broken very much improved. Some plates and frames which had been injured were removed and replaced by sound ones. The vessel was again placed in commission on the 18th of April, and continued her work as usual in the lighthouse and buoy service.

“STANLEY.”

The “Stanley” completed repairs and entered upon her work on the 26th November. The vessel was employed in taking up the Indian rocks and Tryon shoal buoys and conveying them to Charlottetown for winter storage. The mail and passenger service was begun on the 4th of December, 1893, between Charlottetown and Pictou, and the steamer continued on that route until the 16th of the same month. The straits and bay between Point Prim and Charlottetown harbour became full of ice and it was decided to place the “Stanley” on the route between Georgetown and Pictou. This route was continued until the 23rd of March, when the boat began to run between Charlottetown and Pictou. This route was abandoned owing to heavy ice on the 27th March and the vessel resumed her trip between Georgetown and Pictou, and continued on that route up to the 23rd of April. From that date until the 9th May, the vessel plied between Charlottetown and Pictou, being laid up at the latter port for repairs preparatory to entering upon the fishery protection service. The earnings of the “Stanley” for the winter season amounted to \$14,334.66, and the repairs and maintenance for the fiscal year to \$28,141.65.

“ALERT.”

The “Alert” was engaged during the season of navigation in 1893, in conveying supplies to lighthouses and in buoy service and in towing into winter quarters lightships. On the 30th November, 1893, the vessel was placed in winter quarters and the crew paid off. The crew was again engaged on the 26th of March, 1894, and the steamer was prepared for towing out the lightships. This work was entered upon on the 18th April, and the upper and lower traverse lightships were placed. The chief engineer of the department proceeded in the “Alert” on the 25th April, to have the

large buoys below Quebec placed, under his direction and to mark the positions for the gas buoys. After this work, which occupied five days, was completed the steamer was engaged in placing buoys until the supplies for lighthouses were ready to take on board. On the 6th June, the vessel made a trip with supplies for different lighthouses and returned to Quebec on the 16th of the same month. A survey of the hull of the ship was made by Messrs. Brunelle and Olive, hull inspectors, and on consideration of their report the department decided to confine the services of the "Alert" to the River St. Lawrence. The vessel was employed in various kinds of work in the River, until the 10th September, 1894, when she was put out of commission and laid up in Louise Basin, Quebec.

The "Alert" was borrowed from Her Majesty's Imperial Government in April, 1885, for the purposes of exploration in Hudson's Strait and Bay. She was engaged two seasons in this work, and from 1887 has been employed in service for which the steamer was adapted.

" DRUID."

The "Druid" was engaged in quarantine service early in the season of 1893 for the Department of Agriculture, but remaining under the control of the Marine and Fisheries Department.

The "Druid" was formerly a side-wheel boat. It was considered that she would become a more useful boat if converted into a screw steamer. The department entered into a contract with Messrs. Carrier, Laine & Co. to place a compound screw engine in the vessel and make all the alterations necessary. Whilst the work was being done, a part of the hull gave way and the vessel filled with water. It was found necessary to place new plates on the steamer, to put her in seaworthy condition, and a contract for that purpose was entered into. When the whole work was completed the steamer was placed in commission on the 15th June, 1894, and was engaged in conveying supplies to lighthouses in the gulf and buoy service in the St. Lawrence River below Quebec. The "Druid" was not employed in the quarantine service during the season of 1894.

" DOLPHIN."

This steam launch was formerly used by the harbour police as a patrol boat before the force was disbanded. In October, 1893, the "Dolphin" was put in the fishery protection service on Lake Erie.

" QUADRA."

The "Quadra" was engaged in buoy and beacon service during the first week of July, 1893. The lighthouse service was resumed on the 13th July. During this trip the new beacon at Kelp Reef, Haro Strait, and other beacons, were visited. The steamer was employed alternately between lighthouse and buoy and beacon service until the 30th of November, 1893, when she was laid up. This vessel was overhauled during the winter, scraped and painted, and on the 15th March last recommissioned. In April a trip was made to the north of Vancouver Island with the inspector of fisheries on board. Some tidal observations on the west coast of Vancouver have been made in which the "Quadra" was engaged.

" ABERDEEN."

Tenders were invited to be received up to the 7th of March, 1893, for the construction of a steel steamer for lighthouse and buoy service on the Atlantic coast. The contract to include hull, masts, rigging, engines, boilers, and all other machinery and equipments complete and ready for sea. The engines, boilers and machinery saved from the wreck of the government steamer "Napoleon III." to be utilized so far as approved by the government inspector. The notices inviting tenders were posted in the principal cities of the Dominion where shipbuilding is carried on and tenders were invited in Great Britain.

The tender of Messrs. Fleming & Ferguson, of Paisley, Scotland, for £17,800 sterling was the lowest received, and was consequently accepted.

The "Aberdeen" was built with a view of making her a good sea boat as well as a serviceable one, for conveying lighthouse supplies and lifting and placing heavy automatic buoys, and, when required, to be used in the fisheries protection service. The dimensions are: length 180 ft., breadth 31 ft., and depth 19 ft. 3 in., gross tonnage 674·19, registered tonnage 265·49. The steamer is double bottomed the whole length, and has ballast tanks with longitudinal partitions for trimming either side.

She has 5 water-tight bulkheads; her coal bunkers are filled from the after hatch and are convenient to the stoke-hold. The bunkers can be very easily filled, and are fitted with all necessary sliding doors and coal shoots. There is an elevator for hoisting the ashes from the stoke-hold over the side of the ship which can be worked by hand or steam. The magazine is 6 feet square made of $\frac{1}{4}$ -inch plate. The vessel is fitted with special hoisting gear to lift and lower 12 tons, together with necessary gear for ordinary cargo hoisting purposes.

A donkey boiler is fitted in the stoke-hold and is connected with the windlass, steam-winch, steam steering engine, heating pipes and centrifugal pump. The wheel-house is about midship, and the steering gear is worked by steam or by hand.

The steamer is provided with electrical lighting apparatus and is wired throughout, having about 150 incandescent lamps and one large search light. The after cabin is handsomely finished in birdseye maple and mahogany.

The engines of the "Aberdeen" are quadruple expansion, direct acting, inverted. The boilers are water tube boilers of an improved type by the builders. The indicated horse-power of the "Aberdeen" is 1,500, and nominal horse power 200. The speed required by the specification was 13 knots over a measured mile, and $12\frac{1}{2}$ knots for four hours consecutively. At the trial trip, the steamer attained the speed required. The time for delivery was specified in the contract to be the 20th of July, 1894, but strikes or other causes over which the builders had no control formed exceptions. During the time of construction strikes occurred in the coal mines in Scotland, which interfered with forging part of the material, and the completion of the steamer was delayed one month in consequence.

Mr. Nichol MacNicol, of the firm of MacNicol & Co., naval constructors and consulting engineers of Glasgow, Scotland, was appointed inspector of the construction of the vessel, and his compensation was £71 sterling. The steamer was also built under Lloyds inspection and classes 100A1.

The total cost of the "Aberdeen" delivered at Greenock was as follows:—contract price \$86,626.65, inspection \$345.53, charts and nautical instruments, bedding, cutlery

and ship chandlery \$700.53, making a total of \$87,672.71. The steamer was delivered at Greenock to Captain McElhinney of this department on the 23rd August, 1894. Captain McElhinney was accompanied to Greenock by a staff of officers and engineers belonging to the service, and the steamer left Great Britain on the 26th of August and arrived at Halifax on the 7th of September.

“BAYFIELD.”

The “Bayfield” is a wooden steamer of 150 tons gross and 90 tons register, and as been employed in the hydrographic survey of Georgian Bay. During the month of November, 1893, the “Bayfield” was employed in the fishery protection service.

“SIR JAMES DOUGLAS.”

This steamer still remains out of commission. The machinery was overhauled during the last winter, and was found in good condition.

The following statement shows the expenditure for maintenance and repairs of each steamer, and the receipts for the fiscal year ended the 30th June, 1894.

Name.	Repairs.		Main-tenance.		Total.	Receipts.		
	\$	cts.	\$	cts.	\$	cts.	\$	cts.
" Druid ".....	9,621	30	7,668	91	7,290	21	9,875	39
" Alert ".....	2,827	32	15,420	02	18,247	34	62	80
" Newfield ".....	4,444	79	21,803	96	26,248	75	3,203	00
" Lansdowne ".....	11,083	68	18,559	65	29,643	33	10	00
" Quadra ".....	3,336	85	18,517	88	21,854	73	1,228	06
" Stanley ".....	9,077	20	19,064	45	28,141	65	14,334	66
" Sir Jas. Douglas ".....	7	50	92	50	100	00		
General account	\$40,398	64	\$101,127	37	\$141,526	01	\$28,713	91
					961	41		
					\$142,487	42		

Expenditure	\$142,487 42
Receipts	28,713 91
Excess expenditure over receipts	\$113,773 51

COST OF MAINTAINING LIGHTHOUSES AND DOMINION STEAMERS.

The following comparative statement shows the expenditure on account of maintenance of light-houses, steam fog-whistles, and steam fog-horns from the years 1883-84 to 1893-94, both inclusive. The method of auditing all accounts in the department before payment, has been followed of late years :—

Year.	No. of Lights.	No. of Fog-whistles.	No. of Fog-horns, Bell and Bombs.	Cost of Maintenance.
				\$ cts.
1883-84.....	597	23	10	456,868 33
1884-85.....	617	23	12	478,064 04
1885-86.....	625	23	16	505,929 27
1886-87.....	658	23	24	476,514 44
1887-88.....	664	23	27	464,471 76
1888-89.....	675	24	29	459,423 80
1889-90.....	705	23	32	434,802 10
1890-91.....	710	23	31	455,254 42
1891-92.....	741	22	56	445,140 16
1892-93.....	747	22	56	480,553 42
1893-94.....				470,549 27

STATEMENT showing cost of maintaining Dominion Steamers from 1884 to 1894.

Year.	Cost of Maintenance.
	\$ cts.
1883-84.....	122,816 25
1884-85.....	148,864 26
1885-86.....	130,759 83
1886-87.....	141,424 42
1887-88.....	150,659 19
1888-89.....	126,629 33
1889-90.....	114,959 20
1890-91.....	111,437 03
1891-92.....	127,406 28
1892-93.....	146,521 77
1893-94.....	142,487 42

CERTIFICATES TO MASTERS AND MATES FOREIGN SEA-GOING.

The report of the chairman of the Board of Examiners of Masters and Mates of sea-going ships for the twelve months ending 30th June, 1894, will appear as appendix to this report.

During the fiscal year it will be seen by reference to the report in the appendix, the Board of Examiners have held meetings for the examination of candidates at the ports of Halifax, N.S.; St. John, N.B., Quebec and Yarmouth, N.S. Ninety-one candidates presented themselves for examination at the ports named; 60 succeeded in passing, while 31 failed. Of the 60 that passed, 32 received certificates as master and 28 as mate.

The number of candidates who have passed and obtained sea-going masters' certificates of competency since the Act went into operation, viz., 16th September, 1871, and to the 30th June, 1894, is 879, and the amount paid for certificates at the rate of \$10 each, \$18,710. During the same period, 1,279 candidates received certificates of competency as mate, and the amount paid, at the rate of \$5 each, was \$6,495.

In an appendix to this report a list will be found of all who have obtained certificates of competency and service, either as master or mate, during the year ended 30th June, 1893.

INLAND AND COASTING CERTIFICATES.

During the twelve months ended 30th June, 1894, the number of candidates who have passed and obtained masters' certificates of service is 111, and the amount paid for their certificates at the rate of \$4 each was \$444. During the same period 24 candidates applied for certificates of service as mate, and the amount paid at the rate of \$2 each was \$48.

Applicants for certificates of competency as master number 206, and the amount paid at the rate of \$8 each was \$1,648. Forty-five applied for certificates of competency as mate, and the amount paid at the rate of \$4 each was \$260. The amount received for renewed certificates of competency and service was \$41, making a total of \$2,441, received from masters' and mates' inland and coasting certificates.

A list of certificates issued during the twelve months ended 30th June, 1894, will be found in the supplement to this report.

The total amount of fees received on account of certificates of competency and service, sea-going and inland and coasting, during the fiscal year ended 30th June, 1894, amounted to \$2,907.04, and the amount in detail expended on account of this service, as will be seen by reference to Appendix No. 1, to this report, was \$3,721.33. The vote for this service was \$5,000, and the sum expended to 30th June, 1894, \$3,721.33, leaving an unexpended balance of \$1,278.67.

The following statement shows the total receipts and expenditure on account of masters and mates since 1871 :—

			Expenditure.		Receipts.	
			\$	cts.	\$	cts.
For the fiscal year ended 30th June, 1871			1,410	45		
do	do	1872	4,312	07	1,344	00
do	do	1873	6,466	18	4,963	00
do	do	1874	4,520	19	2,995	00
do	do	1875	5,696	62	2,715	00
do	do	1876	4,672	08	2,021	87
do	do	1877	4,050	00	1,740	50
do	do	1878	4,249	76	1,296	50
do	do	1879	4,250	12	1,334	50
do	do	1880	4,253	43	1,547	00
do	do	1881	3,888	41	1,333	50
do	do	1882	3,965	19	1,132	50
do	do	1883	4,021	20	1,314	00
do	do	1884	3,909	59	9,437	50
do	do	1885	4,324	15	2,897	00
do	do	1886	5,245	28	2,152	00
do	do	1887	4,855	93	2,172	00
do	do	1888	5,060	96	3,220	80
do	do	1889	4,381	04	2,202	00
do	do	1890	4,117	83	2,186	00
do	do	1891	4,255	24	2,586	00
do	do	1892	4,363	88	2,149	00
do	do	1893	4,116	99	2,484	00
do	do	1894	3,721	33	2,907	04
Expenditure			104,107	97	58,150	71
Receipts			58,150	71		
Excess of expenditure over receipts			45,957	26		

FOREIGN SEA-GOING.

STATEMENT showing the number of masters' and mates' certificates of competency and service issued during the six months ended 30th June, 1894, at different Ports in the Dominion.

Victoria.		Halifax.		St. John.		Quebec.		Yarmouth.		Charlottetown.	
Master.	Mate.	Master.	Mate.	Master.	Mate.	Master.	Mate.	Master.	Mate.	Master.	Mate.
1	1	10	7	2	1	1	4	2	...	...	...

CERTIFICATES OF

Place of examination.	COASTING.		INLAND.		INLAND.	
	Master.	Mate.	Master.	Mate.	Master.	Mate.
Ottawa.....						
St. Catharines.....			4 F. and A.	7 F. and A.	12 steamer.	3 steamer.
Yarmouth.....	2 steamer 1 square rig.					
St. John.....	17 F. and A., 5 square rig.					
Victoria.....	7 steamer.					
Kingston.....			1 F. and A.		1 steamer.	1 steamer.
Quebec.....	4 steamer, 2 square rig, 1 F. and A.	1 square rig.				
Toronto.....					1 steamer.	
Halifax.....						
Fredericton.....					2 steamer.	
Winnipeg.....						
	39	1	5	7	16	4

CERTIFICATES OF

Halifax.....	1 F. and A.	2 F. and A.				
Parrsborough.....	1 F. and A.	5 F. and A.				
Charlottetown.....	1 st. tug, 6 F. and A., 1 steamer, 1 square rig.					
St. Catharines.....						
Canning.....	1 square rig.					
Quebec.....	1 F. and A.					
Toronto.....						
Richibucto.....	1 F. and A.					
St. John.....						
Ottawa.....	2 st. tug.			2 F. and A.	1 steamer.	
Digby.....	1 steamer.					
Kentville.....	1 F. and A.					
Kingston.....				1 F. and A.		
Rat Portage.....						
Pictou, N. S.....						1 steamer.
	19	7		3		1

COMPETENCY.

INLAND.		MINOR INLAND.		MINOR INLAND.		MINOR INLAND.	
Master.	Mate.	Master.	Mate.	Master.	Mate.	Master.	Mate.
			1 steamer...	1 F. and A.		6 steam tug.	1 steam tug.
		6 steamer...				1 steam tug.	
		5 steamer...	2 steamer...			5 steam tug.	2 steam tug.
		3 steamer...	3 steamer...				
		7 steamer...	1 steamer...			13 steam tug	
			1 steamer...				
1 st. tug...		1 steamer...				1 steam tug.	
		13 steamer...				8 steam tug.	
1		35	8	1		34	3

SERVICE

			1 F. and A.			
				2 F. and A.	3 steam tug.	
1 steam tug.		2 steamer...			10 steam tug	
		2 steamer...				
		1 steamer...	1 steamer...	1 F. and A.		
		1 steamer...		1 F and A.		
		1 steamer...				
1		7	1	2	2	13

WRECKS AND CASUALTIES.

The total number of casualties to British, Canadian and foreign sea-going vessels reported to the department as having occurred in Canadian waters and to Canadian sea-going vessels in waters other than those of Canada during the twelve months ended 30th June, 1894, was 86, representing a tonnage of 36,777 tons register, and the amount of loss, both partial and total, to vessels and cargoes so far as ascertained was \$322,225.

The number of lives reported lost in connection with these casualties was 10. A statement of the wrecks and casualties forms an appendix to this report.

SICK AND DISTRESSED MARINERS.

Under the provisions of chap. 76, Revised Statutes, a duty of two cents per ton register is levied on every vessel arriving in any port in the province of Quebec, Nova Scotia, New Brunswick, Prince Edward Island and British Columbia, the money thus collected forming "The Sick Mariners' Fund." Vessels of the burden of 100 tons and less, pay the duty once in each calendar year, and vessels of more than 100 tons three times in each year.

By an amendment to this Act passed at the session of Parliament in 1886, 50-51 Vic., chap. 40, it is provided that no vessel which is not registered in Canada and which is employed exclusively in fishing or on a fishing voyage, shall be subject to the payment of this duty.

The receipts for the fiscal year ended 30th June last amounted to \$49,105.49, being an increase of \$2,915.85 as compared with the preceding year. The increase, or decrease in receipts of sick mariners' dues in the various provinces were as follows:—Quebec, increase \$1,001.50; Nova Scotia, increase \$1,427.93; New Brunswick, increase \$467.40; Prince Edward Island, decrease \$23.40; British Columbia, increase \$85.78.

The Sick Mariners Act does not apply to the province of Ontario and consequently no dues are collected from vessels in that province, although a small expenditure is incurred on account of sick seamen. For a number of years past a vote of \$500 has been made by Parliament to the General Hospital at Kingston and a similar amount to the General Hospital at St. Catharines for the care of such seamen as may receive medical attendance in them. During the fiscal year ended 30th June sick seamen were paid for at a per diem rate of 90 cents. The amount paid to St. Catharines Hospital was \$287.10 for attendance on 9 sick seamen, 317 days. The sum of \$500.00 was paid the Kingston Hospital for attendance on sick seamen.

In the province of Quebec the expenditure on account of sick seamen amounted to \$7,254.78, being \$625.35 more than the previous year. The total collections for the entire province amounted to \$15,129.93, being \$1,001.50 more than the previous year.

At the port of Montreal sick seamen are cared for at the General Hospital and at Notre Dame Hospital under an arrangement made by the department by which 90 cents per diem is paid for board and medical attendance of each seaman. The number of seamen admitted to the Montreal General Hospital was 145, and the number of days during which they received treatment and board was 1,368. The total cost, including ambulance hire, being \$1,249.20. The amount paid the Notre Dame Hospital was \$1,561.50 for the treatment of 160 sick seamen for a total number of 1,735 days.

Chicoutimi Hospital received 11 seamen to whom medical treatment and board were given at a cost of \$331.20. The sick mariners' dues collected at the port of Montreal during the fiscal year ended 30th June amounted to \$4,833.58.

At the port of Quebec sick seamen were cared for at the Jeffrey Hale and the Hotel Dieu Hospitals, the sum of 90 cents for each seaman is allowed in return for medical attendance and board. The sum paid the Jeffrey Hale Hospital was \$1,710.80, where 160 men received treatment for a total number of 1,892 days. The sum of \$499.40 was paid the Hôtel Dieu Hospital for attendance to 19 seamen 546 days. At Hôtel Dieu de Lévis 1 seaman was treated 60 days at a cost of \$54. The sick mariners' dues collected at Quebec amounted to \$7,956.00.

The expenditure on account of sick seamen in the province of New Brunswick for the fiscal year amounted to \$7,001.24, being less than the preceding year, and the collection of dues to \$9,461.02, or \$467.40 more than the previous year. Marine hospitals have been maintained at Miramichi, Richibucto and Bathurst.

The Marine Hospital at St. John has been closed; a more economical and satisfactory arrangement for the treatment of sick seamen has been made with the St. John General Public Hospital.

The department entered into an arrangement with the authorities of the St. John General Public Hospital, to have the sick seamen in the Marine Hospital, transferred to the Public Hospital on the 1st February, 1893. The Commissioners of the General Public Hospital agreed to take care of sick seamen entitled to medical attendance and board for the sum of 90 cents per day, the same as is paid for seamen in public hospitals in Montreal, Halifax, Quebec and Charlottetown.

At the General Public Hospital, St. John, 300 seamen were treated 3,998 days at a cost of \$3,680.87.

At Miramichi, 56 seamen were admitted and received treatment, 1,002 days, at a cost of \$1,180.86.

At Richibucto, 3 seamen were admitted and received treatment for 76 days. The cost of maintaining the hospital was \$382.55.

At Bathurst, 13 seamen were in hospital 407 days. The cost of maintaining the hospital during the year was \$728.71.

The St. Andrew's Hospital is in charge of the matron, who is allowed to charge \$3.00 per week for boarding sick seamen. No salaries are paid in connection with the maintenance of the hospital. At this hospital 5 seamen were treated 78 days at a cost of \$144.38.

The Sackville Hospital has been leased to Mr. Bradford Carter for three years from 1892, at a nominal rental. The terms of the lease require Mr. Carter to keep the buildings in repair, and if the department should require the hospital at any time, it is to be handed over on notice being given.

In the province of Nova Scotia, marine hospitals are maintained at the ports of Yarmouth, Pictou, Sydney, Lunenburg and Point Tupper. The total expenditure on account of sick seamen in the province of Nova Scotia for the fiscal year amounted to \$13,949.62, and the receipts to \$16,882.53.

The Marine Hospital at Yarmouth is located at Bunker's Island; 19 seamen were admitted during the year ended 30th June, who were treated 447 days. The expenditure for this purpose being \$367.45.

At Halifax provision is made for the care of sick seamen at the Victoria General Hospital under arrangements made with the managers, by which the sum of 90 cents per diem is allowed for board and medical attendance to sick seamen. The sum paid the managers of the hospital for board and medical treatment during the past fiscal year was \$5,409.30 ; 378 men were admitted, and the number of days for which treatment is charged is 7,334.

At Lunenburg, 28 seamen were admitted and received medical treatment 572 days. The cost of maintaining the hospital being \$759.02.

At Pictou, 19 seamen were admitted to the hospital, their total treatment being for 355 days ; the sum paid in connection with maintaining the hospital was \$570.83.

At Sydney, 68 seamen received medical treatment, the total number of days being 735, and the amount expended in maintaining the hospital was \$737.74.

At Point Tupper, 10 seamen were admitted to the hospital, the total number of days for which they received treatment being 71, and the amount expended in connection with keeping the hospital was \$245.83.

In the province of Prince Edward Island the amount expended on account of sick and disabled seamen during the fiscal year was \$1,877.69 ; and the receipts from sick mariners' dues were \$460.54.

Sick seamen are cared for at the Charlottetown and Prince Edward Island Hospitals under arrangements made with the managers of these institutions at the same rate as is paid to the public hospitals in other parts of the Dominion.

The Charlottetown hospital admitted 36 sick seamen, giving them treatment for 1,314 days ; the amount paid was \$1,182.60.

At the Prince Edward Island Hospital 12 men received medical treatment for a total number of 372 days. The sum of \$334.80 was paid to the managers for the fiscal year ended 30th June.

In the province of British Columbia the sum of \$3,904.38 was expended for sick and disabled seamen, while the receipts from the collection of sick mariners' dues amounted to \$7,215.88.

The Marine Hospital at Victoria has in attendance a medical superintendent with a salary of \$300 per annum, a keeper whose salary is \$500 per annum ; he is also allowed a rate of \$5 per week for board and attendance of each seamen. The keeper procures fuel, light, bedding, etc., at his own expense. The number of seamen admitted to the hospital for the past year was 106, and the total number of days during which they received treatment was 799, and the sum expended was \$2,075.36.

At ports where no hospitals are established, in the province of Quebec, Nova Scotia, New Brunswick, British Columbia and Prince Edward Island, sick seamen are cared for under the direction of the chief officer of customs when the vessels to which the seamen belong have paid dues, according to law. A circular to collectors of customs was issued 7th February, 1891, permitting sick seamen to be attended at the port of arrival of a vessel, provided that the regular dues were previously paid at some port.

During the fiscal year the sum of \$2,666.13 was expended [for shipwrecked and destitute seamen, under the provisions of the Sick and Distressed Mariners' Act. Of this sum \$1,278.63 were paid to Her Majesty's Imperial Government to reimburse expenses incurred in caring for shipwrecked and distressed Canadian seamen in foreign ports.

The total expenditure by this department on account of sick and disabled seamen, and distressed and shipwrecked seamen amounted to \$38,403.94, and the appropriation

by Parliament for this service was \$38,000. The dues collected amounted to \$49,105.49. It will be seen that the receipts exceeded the expenditure \$10,701.55.

The receipts and expenditure in connection with this service during the preceding 25 fiscal years were as follows :—

			Receipts.	Expenditure.
			\$ cts.	\$ cts.
For the fiscal year ended 30th June, 1869.			31,353 78	26,987 64
do do 1870.			31,410 46	27,029 34
do do 1871.			29,683 41	28,971 22
do do 1872.			34,911 64	34,947 60
do do 1873.			37,136 10	41,016 43
do do 1874.			41,500 16	59,778 90
do do 1875.			37,801 46	50,684 76
do do 1876.			41,287 66	48,828 49
do do 1877.			43,739 21	51,647 94
do do 1878.			44,665 07	43,780 90
do do 1879.			37,779 57	42,729 36
do do 1880.			42,523 20	42,160 91
do do 1881.			49,779 72	40,667 52
do do 1882.			45,951 47	39,359 11
do do 1883.			45,573 42	36,249 65
do do 1884.			48,667 07	39,553 58
do do 1885.			39,068 39	44,501 57
do do 1886.			40,848 05	50,377 62
do do 1887.			42,334 92	37,417 35
do do 1888.			41,669 64	36,447 85
do do 1889.			39,306 29	41,320 59
do do 1890.			47,881 75	41,729 11
do do 1891.			43,829 68	35,155 12
do do 1892.			45,381 92	33,498 83
do do 1893.			46,190 69	35,052 37
do do 1894.			49,105 40	38,403 94
Total			1,079,380 13	1,051,334 40
Deduct expenditure from receipts			1,051,334 40	
Excess of receipts over expenditure			28,045 73	

MERCHANT SHIPPING.

The total number of vessels remaining on the register books of the Dominion on the 31st December, 1894, including old and new vessels, sailing vessels, steamers and barges, was 7,245, measuring 869,624 tons, register tonnage, being a decrease in tonnage of 42,915 tons as compared with 1893. The number of steamers on the registry books on the same date was 1,640, with a gross tonnage of 240,906 tons. Assuming the average value to be \$30 per ton, the value of the registered tonnage of Canada, on the 31st December last, would be \$26,088,720.

The number of new vessels built and registered in the Dominion of Canada during the last year was 326, measuring 21,243 tons register tonnage. Estimating the value of the new tonnage at \$45 per ton, it gives a total value \$955,935 for new vessels.

A statement follows, showing the number of vessels and number of tons on the register books at the different ports of registry in the Dominion on the 31st December last, along with a comparative statement of the tonnage from 1873 to 1894. A statement is also published of the number of vessels built and registered in the Dominion during the last year, and a comparative statement of the number of new vessels built and registered from 1874 to 1894, both inclusive.

LIST of Ports at which Vessels may be Registered, showing the Number of New Vessels Built and Registered, in 1894.

PROVINCE OF NEW BRUNSWICK.

Name of Port.	Total Number of Sailing Ships and Steamers.	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
Chatham	26			440
Dorchester				
Moncton				
Richibucto	1			799
Sackville	1			109
St. Andrews				
St. John	12			1,186
Total	40			2,534

PROVINCE OF NOVA SCOTIA.

Amherst	8			906
Annapolis	3			300
Arichat	2			23
Barrington	8			213
Canso	1			45
Digby	4			108
Guyssborough				
Halifax	13			451
Liverpool	6			348
Lunenburg	21			1,346
Maitland	2			356
Parrsborough	10			1,709
Pictou	2			29
Port Hawkesbury	9			111
Port Medway	1			199
Pugwash				
Shelburne	16			684
Sydney	10			1,355
Truro				
Weymouth	1			17
Windsor	3			379
Yarmouth	8			142
Total	128			8,721

PROVINCE OF QUEBEC.

Amherst, M. I.				
Gaspe	2			24
Montreal	30			3,694
New Carlisle				
Perce				
Quebec	23			694
Total	55			4,412

PROVINCE OF ONTARIO.

Amherstburg				
Belleville	2			15
Bowmanville				
Brockville				
Chatham	1			42
Chippewa				
Cobourg				
Collingwood	6			306
Cornwall				

LIST of Ports at which Vessels may be Registered, showing the Number of New Vessels Built and Registered, in 1894—*Continued.*PROVINCE OF ONTARIO—*Continued.*

Name of Port.	Total Number of Sailing Ships and Steamers.	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
Cramahe	2			278
Deseronto	2			15
Dunnville				
Goderich	3			32
Hamilton	6			58
Kingston	6			154
Morrisburg				
Napanee				
Oakville				
Ottawa	20			625
Owen Sound	1			12
Pictou	1			87
Port Arthur	1			24
Port Burwell				
Port Colborne				
Port Dover				
Port Hope	1			8
Port Rowan				
Port Stanley	1			540
Prescott				
Sarnia				
Saugeen				
Sault Ste. Marie				
St. Catharines	6			757
Toronto	5			184
Wallaceburg				
Whitby				
Windsor				
Total	64			3,137

PROVINCE OF PRINCE EDWARD ISLAND.

Charlottetown	3			183
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PROVINCE OF BRITISH COLUMBIA.

New Westminster	9			464
Vancouver	4			510
Victoria	12			926
Total	25			1,900

PROVINCE OF MANITOBA.

Winnipeg	11			356
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SUMMARY.

New Brunswick	40			2,534
Nova Scotia	128			8,721
Quebec	55			4,412
Ontario	64			3,137
Prince Edward Island	3			183
British Columbia	25			1,900
Manitoba	11			356
Total	326			21,243

COMPARATIVE STATEMENT of New Vessels Built and Registered in the Dominion of both

Provinces.	1874.		1875.		1876.		1877.		1878.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
New Brunswick.....	90	42,027	65	33,483	61	31,040	54	31,158	56	27,368
Nova Scotia.....	175	84,480	177	67,106	194	58,771	219	47,980	166	49,784
Quebec.....	73	20,796	103	22,825	51	17,800	62	19,253	46	10,870
Ontario.....	50	10,797	53	7,760	47	5,397	28	3,316	30	2,409
Prince Edward Island.....	88	24,634	83	19,838	62	14,571	62	17,026	38	10,382
British Columbia.....	5	276			1	121	2	204	2	45
Manitoba.....							3	48	1	15
	490	183,010	480	151,012	416	127,700	430	118,985	339	100,873
Add new vessels built in Canada which proceeded to the United Kingdom under a Governor's pass without being registered	6	7,746			3	2,721	2	1,943	1	663
Add new vessels which left Quebec for registration in Germany.....					1	480				
Total.....	496	190,756	480	151,012	420	130,901	432	120,928	340	101,536

Provinces.	1885.		1886.		1887.		1888.		1889.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
New Brunswick.....	34	7,736	34	4,931	18	2,909	32	2,530	50	4,792
Nova Scotia.....	102	24,703	93	20,948	87	12,310	116	12,965	126	19,645
Quebec.....	29	4,556	27	2,683	28	2,888	23	2,669	27	3,759
Ontario.....	45	4,509	52	2,075	66	2,993	62	5,095	45	3,259
Prince Edward Island.....	11	1,707	12	1,318	7	601	12	1,412	12	1,503
British Columbia.....	6	648	8	154	9	376	18	448	12	840
Manitoba.....	13	320	3	98	8	439	1	11	8	548
	240	43,179	229	32,207	224	22,516	264	25,130	280	34,346
Add new vessels built in Canada which proceeded to the United Kingdom under a Governor's pass without being registered										
Add new vessels which left Quebec for registration in Germany.....										
Total.....	240	43,179	229	32,207	224	22,516	264	25,130	280	34,346

Canada during the Year ended 31st December, in each year from 1874 to 1894, inclusive.

1879.		1880.		1881.		1882.		1883.		1884.	
Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
43	19,067	63	18,896	57	18,250	66	16,820	72	21,103	46	12,888
126	39,208	126	31,257	150	40,465	117	26,711	202	35,765	178	42,032
29	7,421	33	8,219	56	5,673	26	6,785	42	6,594	32	3,815
42	2,464	44	3,610	54	5,111	55	4,369	34	4,311	58	4,446
20	5,279	21	3,359	15	4,351	15	3,508	17	5,943	21	5,189
5	788			2	85	8	1,631	5	849	15	675
		1	100	2	116	1	289	2	125	37	3,366
265	74,227	271	65,441	336	74,060	288	60,113	374	74,090	387	72,411
						1	1,029				
265	74,227	271	65,441	336	74,060	289	61,142	374	74,090	387	72,411
1890.		1891.		1892.		1893.		1894.			
35	5,572	43	6,269	21	1,873	119	2,819	40	2,534		
150	33,907	130	35,528	105	16,446	111	15,089	128	8,721		
25	4,880	46	4,200	34	2,620	53	4,220	55	4,412		
41	4,917	44	2,662	34	3,684	49	4,126	64	3,137		
12	2,008	5	1,000	9	967	3	634	3	183		
15	876	41	2,364	46	2,887	19	944	25	1,900		
7	218	3	122	6	296	8	608	11	356		
285	52,378	312	52,145	255	28,773	362	28,440	326	21,243		
285	52,378	312	52,145	255	28,773	362	28,440	326	21,243		

STATEMENT showing the number of Vessels and number of Tons on the Registry Books of the Dominion of Canada, on the 31st December, 1894.

PROVINCE OF NEW BRUNSWICK.

Name of Port.	Total Number of Sailing Ships and Steamers.	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
Chatham.....	320	31	1,454	9,370
Dorchester.....	9			4,921
Moncton.....	16			2,600
Richibucto.....	18	3	129	2,846
Sackville.....	12	2	41	1,218
St. Andrews.....	140	5	108	3,114
St. John.....	488	63	7,437	111,888
Total.....	1,003	104	9,169	136,257

PROVINCE OF NOVA SCOTIA.

Amherst.....	8			906
Annapolis.....	60	3	85	6,228
Arichat.....	122	1	66	5,110
Barrington.....	57	1	15	2,106
Canso.....	3			151
Digby.....	175	5	254	11,453
Guysborough.....	33			1,561
Halifax.....	795	53	10,792	44,201
Liverpool.....	84	2	137	7,073
Lunenburg.....	335	6	271	27,199
Maitland.....	30			28,015
Pugwash.....	8			634
Parrsborough.....	130	2	201	32,160
Pictou.....	65	17	1,126	13,934
Port Hawkesbury.....	74	2	43	2,616
Port Medway.....	23	1	45	1,902
Sydney.....	119	10	942	5,809
Shelburne.....	106	1	38	6,657
Truro.....	4			1,441
Windsor.....	167	11	2,450	107,969
Weymouth.....	40	2	175	3,727
Yarmouth.....	272	14	4,477	60,390
Total.....	2,710	131	21,117	371,432

PROVINCE OF QUEBEC.

Amherst, M. I.	22			826
Gaspé.....	31	1	708	2,139
Montreal.....	493	160	54,249	84,169
New Carlisle.....	14	3	49	508
Percé.....				
Quebec.....	867	131	20,398	72,948
Total.....	1,427	295	75,404	160,590

PROVINCE OF ONTARIO.

Amherstburg.....	3			148
Belleville.....	16	10	520	824
Brockville.....	25	23	317	361
Bowmanville.....	4			752
Collingwood.....	60	58	6,500	4,805
Chippewa.....	3	2	263	153
Cramahe.....	2			273
Chatham.....	29	18	1,184	1,719
Cobourg.....	5	1	23	455

STATEMENT showing the number of Vessels and number of Tons on the Registry Books of the Dominion of Canada, on the 31st December, 1894—*Continued.*

PROVINCE OF ONTARIO—*Continued.*

Name of Port.	Total Number of Sailing Ships and Steamers.	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
Cornwall				
Dunnville.. ..	9	5	695	1,031
Deseronto. . . .	18	13	1,348	1,804
Goderich	45	96	746	1,912
Hamilton	53	40	8,427	7,238
Kingston	192	73	9,223	25,327
Napanee	3			409
Owen Sound.....	34	31	4,959	3,733
Ottawa	289	59	13,525	25,121
Oakville	3			157
Prescott	29	15	755	3,906
Port Burwell.. .	14	6	54	1,032
Port Arthur.....	8	8	3,078	1,991
Port Dover	19	6	170	1,139
Port Colborne ..	6	2	95	683
Port Hope	64	38	3,302	6,153
Port Rowan.	5	1	168	524
Port Stanley .. .	11	9	1,260	1,062
Picton	32	11	1,383	3,330
Sarnia	27	20	7,364	6,743
Sault Ste. Marie .	14	12	477	528
St. Catharines ..	133	67	9,383	19,942
Saugeen				
Toronto	235	160	16,748	17,327
Wallaceburg	33	18	1,065	2,121
Windsor	54	28	6,120	5,283
Whitby.....	3			514
Total	1,480	830	99,092	148,525

PROVINCE OF MANITOBA.

Winnipeg.....	98	61	6,132	6,715
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PROVINCE OF PRINCE EDWARD ISLAND.

Charlottetown.....	191	23	5,794	19,650
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PROVINCE OF BRITISH COLUMBIA.

Victoria.....	218	101	16,461	17,609
New Westminster ..	75	61	4,769	6,395
Vancouver	43	34	2,968	2,451
Total	336	196	24,198	26,455

SUMMARY.

New Brunswick ..	1,003	104	9,169	136,257
Nova Scotia.....	2,710	131	21,117	371,432
Quebec	1,427	295	75,404	160,500
Ontario.....	1,480	830	99,092	148,525
Manitoba.....	98	61	6,132	6,715
Prince Edward Island	191	23	5,794	19,650
British Columbia..	336	196	24,198	26,455
Total	7,245	1,640	240,906	869,624

COMPARATIVE STATEMENT showing the Number of Vessels and Number of Tons on
from 1873 to

Provinces.	1873.		1874.		1875.		1876.		1877.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
New Brunswick	1,147	277,850	1,144	294,741	1,133	307,926	1,154	324,513	1,133	329,457
Nova Scotia	2,803	449,701	2,787	479,669	2,786	505,144	2,867	529,252	2,961	541,579
Quebec	1,842	214,083	1,837	218,946	1,831	222,965	1,902	228,502	1,951	248,399
Ontario	681	89,111	815	113,008	825	114,990	889	123,947	926	131,761
P. E. Island	280	38,918	312	48,388	335	50,677	338	50,692	342	55,547
British Columbia	30	4,095	35	3,611	40	3,685	40	3,809	43	3,479
Manitoba					2	178	2	178	6	246
Total	6,783	1,073,718	6,930	1,158,363	6,952	1,205,565	7,192	1,260,893	7,362	1,310,468
	1884.		1885.		1886.		1887.		1888.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
New Brunswick	1,096	308,132	1,060	288,589	1,042	269,224	1,027	255,126	1,009	239,332
Nova Scotia	2,942	544,048	2,988	541,832	2,929	526,921	2,845	498,878	2,851	485,709
Quebec	1,628	202,842	1,631	203,635	1,650	232,556	1,586	189,064	1,498	178,520
Ontario	1,184	142,387	1,223	144,487	1,248	140,929	1,275	139,548	1,330	139,502
P. E. Island	234	39,213	227	36,040	225	30,658	225	29,031	218	26,586
British Columbia	116	11,403	123	11,834	134	11,900	149	12,789	167	14,249
Manitoba	55	5,722	63	5,439	65	5,578	71	5,811	69	5,745
Total	7,254	1,253,747	7,315	1,231,856	7,294	1,217,766	7,178	1,130,247	7,142	1,089,642

the Registry Books of the Dominion of Canada, on the 31st December, in each Year, 1894, both inclusive.

1878.		1879.		1880.		1881.		1882.		1883.	
Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
1,142	335,965	1,135	340,491	1,097	336,976	1,087	333,215	1,065	308,980	1,107	315,906
3,003	553,368	2,975	552,159	2,977	550,448	3,025	558,911	3,026	546,778	3,037	541,715
1,676	249,349	1,975	246,025	1,889	234,341	1,830	224,936	1,754	215,804	1,739	216,577
958	135,440	1,006	136,987	1,042	137,481	1,081	139,998	1,112	137,061	1,133	140,972
322	54,250	298	49,807	288	45,931	273	45,410	248	41,684	241	49,446
51	4,482	60	4,701	63	5,049	74	6,296	84	7,687	94	9,046
17	1,161	22	1,924	21	1,992	24	2,130	23	2,783	24	2,778
7,469	1,333,015	7,471	1,332,094	7,377	1,311,218	7,394	1,310,896	7,312	1,260,777	7,374	1,276,440
1889.		1890.		1891.		1892.		1893.		1894.	
1,013	218,873	981	209,460	969	193,193	946	181,779	1,010	156,086	1,003	136,257
2,855	464,441	2,793	461,194	2,778	461,758	2,731	425,690	2,715	396,263	2,710	371,432
1,455	168,500	1,399	164,003	1,404	162,330	1,408	162,638	1,426	161,121	1,427	160,590
1,352	141,849	1,312	138,738	1,345	138,914	1,347	141,750	1,370	146,665	1,480	148,525
224	25,506	231	26,080	195	23,316	196	22,706	188	20,970	191	19,650
176	15,241	196	16,024	246	19,767	298	23,448	315	24,900	336	26,455
77	6,091	79	6,475	78	6,197	81	6,118	89	6,534	98	6,715
7,153	1,040,481	6,991	1,024,974	7,015	1,005,475	7,007	964,129	7,113	912,539	7,245	869,624

LOAD LINES.

In 1893 the Canadian Parliament passed the following enactment :—

56 VICTORIA, CHAP. 22.

An Act to amend the Merchant Shipping Act, with respect to Load Lines.

[Assented to 1st April, 1893.]

Whereas 'by section 547 of the Act of the Parliament of the United Kingdom known as The Merchant Shipping Act, 1854, it is enacted that the legislative authority of any British possession shall have power by any Act or ordinance confirmed by Her Majesty in Council to repeal, wholly or in part, any provisions of the said Act relating to ships registered in such possession; and whereas by the Act of the said Parliament known as The Merchant Shipping Act, 1876,—which, as is provided by section 2 thereof, is to be construed as one with The Merchant Shipping Act, 1854, and the Acts amending the same,—certain provisions are made in sections 26, 27 and 28 thereof, with respect to the marking of load lines upon British ships; and whereas by sections 1 and 2 of the Act of the said Parliament known as The Merchant Shipping Act, 1890, the provisions of the said sections 26 and 27 are amended in certain particulars; and whereas it is not desirable that the said sections 26 and 27, as so amended, or the regulations which have been or may be made by the Board of Trade thereunder, or the provisions of the said section 28, should apply to ships registered in Canada: Therefore Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, declares and enacts as follows :—

1. Sections 26, 27 and 28 of The Merchant Shipping Act, 1876, and sections 1 and 2 of The Merchant Shipping Act, 1890, of the United Kingdom, are hereby repealed so far as they relate to or affect ships registered in Canada.

2. This Act shall not come into force until Her Majesty's pleasure thereon has been signified by proclamation in the *Canada Gazette*, nor until a proclamation of the Governor in Council bringing it into effect has also been published in the said *Gazette*.

The Imperial Board of Trade, however, did not consider it advisable to recommend the Secretary of State to advise Her Majesty to confirm the Act referred to. The Board is of opinion that the provisions of any Statute made by Canada under the provisions of the 547th section of the Merchant Shipping Act of 1854 have force only touching the territorial limits of the Dominion, and are inoperative in the United Kingdom, and that the only issue involved was, "do the rules press in any sense unfairly upon Canadian ship owners."

The department, however, submitted that the real issue involved appeared to be: Was the Parliament of Canada acting within its powers when by legislature enactment it repealed the Imperial load line sections so far as they relate to Canadian ships without regard to territorial limitations? The department further submitted that had it been the intention of the Imperial Parliament to establish a territorial limitation when enacting the 547th section of the Imperial Merchant Act of 1854, it would have done so in expressed terms as was done in the Merchant's Shipping Act of 1876, section 44, which reads as follows :—

"Nothing in this Act shall apply to any vessel employed exclusively in trading, or going from place to place, in any river or inland water, of which the whole or part is in any British possession, and the provisions of this Act relating to deck cargo shall not apply to deck cargo carried by a ship while engaged in the coasting trade of any British possession."

The Imperial Act of 1867 known as "The British North America Act," concedes to Canada the regulating of her trade, commerce and shipping. Under this provision and the provisions of section 547 of Merchant's Shipping Act, 1854, any Act or ordinance confirmed by Her Majesty in Council, to repeal wholly or in part any provisions of the

Merchant's Shipping Act of 1854, relating to ships registered in such possession, has due legal effect after such Act or ordinance has received the assent, and has been proclaimed in such possession or until such time thereafter as may be fixed by such Act or ordinance for the purpose.

The Parliament of Canada purporting to act under the power conveyed by the 547th section of the Imperial Merchant Shipping Acts of 1854, and the provisions of the British North America Act repealed certain sections of the Merchant Shipping Acts of 1876 and 1890, so far as they relate to or affect ships registered in Canada.

It is not apparent that the 547th section of the Imperial Merchant Shipping Act of 1854, refers to or creates territorial limitations.

It was further submitted that the provision and power apparently conveyed by the 547th section of the Merchant Shipping Act of 1854 was acted on by the Parliament of Canada which passed an act relating to the registration and classification of shipping, and that enactment it contended repealed whatever general provisions might exist in the Imperial enactments upon this subject and which are inconsistent with the provisions of the Canadian Act.

The repealing clause of that Act is as follows:—

“And whereas by the 547th section of the Merchant Shipping Act, 1854, “it is enacted and provided that the legislative authority of any British possession “shall have power by any act or ordinance confirmed by Her Majesty in Council “to repeal wholly or in part any provision of the said Act relating to ships registered “in such possession so much of the said Act and of any other Act amending the said “Act and forming part of the same as is inconsistent with this Act is hereby repealed “so far as relates to ships registered in Canada.”

No exception was at that time or since taken to this legislation nor was it contended that the provisions of the Act had effect only within Canadian territorial limits. The interpretation now suggested by the Board of Trade respecting the powers conferred upon the Canadian Parliament by the Merchant Shipping and the British North America Acts respecting ships registered in Canada is new, and a report was made to council recommending that measures be taken to submit this view of the case to Her Majesty's Government. This recommendation was carried into effect in July last.

To this representation the following despatch was received:—

“Colonial Office to the Governor General.

“DOWNING STREET, September 22nd, 1894.

“MY LORD,—I have the honour to acquaint you that I have had under my consideration your despatch No. 218 of the 21st of July, and its inclosures, respecting the Dominion Load Line Act of 1893.

“The expression used in the paragraph of the letter from the Board of Trade, of 29th December last, to which the Minister of Marine and Fisheries takes exception, may be open to the construction which he has placed upon it, but the object of that letter was not to give a definition of the powers conferred on the Canadian Legislature, under section 547 of the Merchant Shipping Act of 1854, but to point out what, in the opinion of the board, that Legislature was not empowered to do. The point of the paragraph referred to, was that an Act of the Canadian Parliament cannot so run in Great Britain as to control the proceedings of British authorities acting under Imperial Legislation within the United Kingdom.

“It is no doubt the case that the effect of that section of the British North America Act was to delegate to the Dominion Parliament, with the assent of the Crown, the power of making laws applying to Canadian registered ships, not only when within the limits of the Dominion, but also when on the high seas or within a foreign port, in so

far as the jurisprudence of the foreign country recognizes the law of the ship, when within its jurisdiction.

"It could not, however, have been the intention of Parliament to empower the Dominion Legislature practically to legislate for the United Kingdom by repealing or modifying the provisions of Imperial Legislation, applicable within the territorial jurisdiction of the United Kingdom, and I have no doubt, your Ministers will recognize that as the authorities in this country cannot be bound by any other statute law than that which is found in the statute-book of the United Kingdom, the Load Line Act passed by the Dominion Legislature in 1893, is not one, which Her Majesty can be advised to allow.

The suggestion made by the Board of Trade, for a conference between the experts of that department and an expert of the Dominion Government on the subject of the Lord Line Tables, would seem to furnish the most satisfactory mode of arriving at an agreement on this matter, and I would be glad to learn that your government are willing to take part in such a conference.

I have, &c.,

Governor General,

&c., &c., &c.

(Signed)

RIPON.

To the above despatch the Minister replied in the following report to council :—

"MARINE AND FISHERIES, CANADA, OTTAWA, October 11th, 1894.

"To His Excellency

The Governor General in Council.

"The undersigned has the honour to acknowledge the reference of a despatch from the Most Honourable the Marquis of Ripon to Your Excellency, dated 22nd September, upon the subject of your Excellency's despatch, No. 218, of the 21st July, and its enclosures respecting the Dominion Load Line Act of 1893.

"Lord Ripon appears to admit that the view taken by the undersigned touching the expression used in the paragraph of the letter from Board of Trade of the 29th December last is correct, but His Lordship goes on to say that while the effect of the section of the British North America Act to which the undersigned refers was to delegate to the Dominion Parliament, with the assent of the Crown, power to legislate for Canadian registered ships, without limitation, (outside of the rules of international law), it could not have been the intention of the British Parliament to empower the Dominion Legislature practically to legislate for the United Kingdom, by repealing or modifying the provisions of Imperial legislation applicable within the territorial jurisdiction of the United Kingdom, and His Lordship expresses the belief that Your Excellency's Minister will recognize that as the authorities in this country cannot be bound by any other statute-law than that which is found on the statute-book of the United Kingdom, the Load Line Act, by which His Lordship no doubt means the act entitled an act to amend the Merchant Shipping Act with respect to Load Lines, passed by the Dominion Legislature in 1893 is not one which Her Majesty can be advised to allow.

"The preamble of the act in question may be set out here for convenience. It reads as follows :

"Whereas by section five hundred and forty seven of the Act of the Parliament of the United Kingdom known as the Merchant Shipping Act, 1854, it is enacted that the legislative authority of any British possession shall have power by any act or ordinance confirmed by Her Majesty in Council to repeal, wholly or in part, any provisions of the said act relating to ships registered in such possession ; and whereas by the act of the said Parliament known as the Merchant Shipping Act 1876, which, as is provided by section two thereof is to be construed as one with the Merchant Shipping Act 1854, and the acts amending the same,—certain provisions are made in sections twenty-six, twenty-seven and twenty-eight thereof, with respect to the marking of load lines upon British ships ; and whereas by sections one and two of the Act of the said Parliament known as the Merchant Shipping Act, 1890, the provisions of the said sections twenty-six and twenty-seven, are amended in certain particulars ; and whereas it is not desirable that the said sections twenty-six and twenty-seven, as so amended, or the regulations which have been or may be made by the Board of Trade thereunder, or the provisions

of the said section twenty-eight, should apply to ships registered in Canada : Therefore Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, declares and enacts as follows :—

“ Owing to the great importance of the question which has been discussed, the undersigned ventures, through Your Excellency, to press for the further consideration of the wishes of the Canadian Parliament.

“ Your Excellency's Ministers when submitting that the British Parliament granted the authority which Lord Ripon admits to have been vested in the Canadian Parliament by the British North America Act, and which was expressly empowered by the Merchant Shipping Act as well, respecting Canadian Shipping, were aware that the exercise of this authority was subject to the approval and the assent of the Crown, and consequently, the second clause of the statute provides that the act shall not come into force until Her Majesty's pleasure thereon has been signified by Proclamation in the Canada Gazette.

“ It is admitted that this statute is within the powers of the Dominion Parliament.

“ It remains only to consider whether the legislation is such that Her Majesty should be advised to allow it.

“ Lord Ripon is of opinion that it is not such legislation as Her Majesty should be advised to allow.

“ He considers it practically legislates for the United Kingdom.

“ With great deference the undersigned desires to present the view that the statute in no sense attempts to legislate for the United Kingdom, but seeks, under the recognized authority of Imperial Legislation, to place Canadian vessels, when in British ports, upon no better footing than is already permitted to foreign bottoms, since the provisions of the Imperial Load Line Act do not apply to the latter.

“ It seems only reasonable to the undersigned, in view of the provisions of the Merchant Shipping Act, and of the British North America Act, that Canadian shipping should be allowed the same privileges in British ports as are extended to foreign ships.

“ On the other hand great injury appears likely to attend British interests should Her Majesty not be advised as Your Excellency's Ministers have recommended.

“ One large owner of wooden ships in St. John, New Brunswick, recently informed the Department of Marine and Fisheries that ‘ he was doing his utmost to keep his vessels away from British Territory, as it is shown beyond question how British legislation is being made in the interest of foreigners, who can go there, load as deep as they like, carry what crews suit them, buy what provisions they choose, and no one can interfere, while the poor British craft is subject to their recent unreasonable laws in connection with shipping.’

“ He concludes his communication by stating :—

“ ‘ I hold tonnage under four different flags, and I am learning slowly but surely “ that the British flag is the least desirable of the lot.’

“ Another ship owner in St. John, New Brunswick, cites the case of the “ *Orontes* ” a barque.

“ The owner wrote : ‘ The load line put upon her cut down her carrying so much “ that we had no alternative but to sell her to the Norwegians, under which flag she “ can carry full cargo.’

“ The undersigned cannot resist the impression that the load line legislation was adopted by the Imperial Parliament in the interest of ships and ships' crews belonging to the United Kingdom.

“ It is in its object purely domestic, and no doubt has the support of the people of the United Kingdom.

“ That such legislation is not desired by Her Majesty's subjects in Canada is clear, and the undersigned accordingly has the honour to recommend that under these circumstances the point be considered whether this is not after all one of those cases within the terms and intent of the legislation contained in the Merchant Shipping Act, and the British North America Act.

“ The undersigned has further the honour to recommend that a copy of this report, if approved, be forwarded to the Most Honourable the Principal Secretary of State for the Colonies, with a request for his reconsideration of its subject matter.

“ Respectfully submitted,

(Signed) “CHARLES HIBBERT TUPPER.”

Extract from a Report of the Committee of the Honourable the Privy Council by His Excellency on the 12th October, 1894.

The committee of the Privy Council have had under consideration a despatch hereto attached, dated 22nd September, 1894, from the Marquis of Ripon, with regard to Your Excellency's despatch of the 21st July, 1894, and its inclosures respecting the Dominion Load Line Act of 1893.

The committee have had also under consideration a report, hereto attached, dated 11th October, 1894, from the Minister of Marine and Fisheries to whom the despatch was referred.

The committee concurring in the said report, advise that Your Excellency be moved to forward a certified copy of this minute, if approved, and of its annexes to the Most Honourable the Principal Secretary of State for the Colonies, with a request for his reconsideration of its subject matter.

All which is respectfully submitted for Your Excellency's approval.

(Signed) JOHN J. MCGEE,
Clerk of the Privy Council.

The Honourable the Minister of Marine and Fisheries.

GEORGIAN BAY AND NORTH CHANNEL SURVEY.

The report of the chief engineer which forms an appendix to the report contains information relating to the hydrographic surveys in progress under the direction of the department. The report of Mr. W. Bell Dawson, engineer in charge of the tidal survey, will appear as part of the report of the chief engineer. The report also of Mr. W. J. Stewart, who has been in charge of the Georgian Bay and North Channel survey now completed, will form part of the report of the chief engineer. It will be seen that the officers and crew engaged in the survey began their work on the 1st of May last, and ended on the 23rd of October. The expenditure for the past fiscal year amounted to \$16,292.48.

The total expenditure on account of the Georgian Bay and North Channel survey, has been \$215,389.21.

LONGITUDE OF MONTREAL.

By reference to previous reports it will be seen that arrangements were made for determining the exact longitude of Montreal. The question is one of importance and is necessary for the construction of reliable hydrographic and other charts. The report of Professor C. H. McLeod, Superintendent of McGill College Observatory, published as Appendix No. 16, p. 122, to the report of 1892, contains information respecting the observations in connection with the work.

The following letter from Professor McLeod furnishes information as to the present stage of the work.

"MCGILL COLLEGE OBSERVATORY,
"MONTREAL, 30th October, 1893.

"The Honourable

"Sir CHARLES HIBBERT TUPPER,
"Minister of Marine and Fisheries, Ottawa.

"SIR,—Replying to your request I have the honour to report that all my observations in connection with the determination of the longitude of Montreal and Canso, made in the summer of 1892, have been reduced and the results forwarded to the Astronomer Royal for combination with the results of the English observers.

"I have received from the Astronomer Royal the following as 'provisional longitude results':—

"Montreal (The pier of the transit instrument in the observatory).....	4h. 54m. 18.7s.
"Canso (Hazel Hill. The pier near the office of the Commercial Cable Company).....	4h. 4m. 9.3s.
"Waterville (The pier near the office of the Commercial Cable Company).....	0h. 40m. 41.3s.

"My final report cannot be made until the Astronomer Royal has forwarded the completed reduction of the work.

"I am, sir, your most obedient servant,

"C. H. McLEOD."

"MONTREAL, 31st December, 1894.

"*Longitudes.*—I regret that the Astronomer Royal has not yet announced the final values of the longitudes of Montreal and Hazel Hill resulting from the observations made in 1892. I am, however, authorized to state that the final results will not differ materially from the provisional values given in my report for 1893, and that the determination is eminently satisfactory in the accordance of the work of the English observers and my own, in the several stages.

"I am, sir, your obedient servant,

"C. H. McLEOD, *Supt.*

STEAMBOAT INSPECTION AND CERTIFICATES TO ENGINEERS.

The annual report for the year 1893 of the chairman of the board of inspection forms an appendix to this report. The statement showing certificates granted to engineers of steamboat, together with a list of steam vessels inspected and steam vessels not inspected; number of passengers allowed to be carried in each passenger steamboat; steam vessels added to the list, and steamers lost or laid up or rendered unfit for service during the year, will be printed in the supplement.

The amount received during the past fiscal year on account of tonnage dues, inspection of steamboats and certificates to engineers was \$24,853.47, of which the sum of \$24,521.35 was for tonnage dues and inspection fees, and \$571 for certificates to engineers. The expenditure for the fiscal year amounted to \$25,961.36, showing an excess of expenditure over receipts of \$1,107.89.

The following is a comparative statement of receipts and expenditure :—

	Receipts.		Expenditures.	
	\$	cts.	\$	cts.
For fiscal year ended 30th June, 1870.....	12,521	29	7,379	18
do do 1871.....	10,369	96	8,321	00
do do 1872.....	11,710	43	8,500	00
do do 1873.....	15,412	75	11,205	54
do do 1874.....	15,603	19	10,291	58
do do 1875.....	15,011	90	12,199	81
do do 1876.....	13,811	24	13,081	86
do do 1877.....	15,858	42	12,073	01
do do 1878.....	12,431	25	13,228	28
do do 1879.....	12,331	16	13,076	46
do do 1880.....	15,424	02	11,854	34
do do 1881.....	16,906	49	12,211	65
do do 1882.....	15,277	78	14,835	97
do do 1883.....	12,577	36	16,209	02
do do 1884.....	15,371	79	21,893	28
do do 1885.....	13,343	66	23,235	04
do do 1886.....	14,087	76	21,775	57
do do 1887.....	12,701	20	22,837	80
do do 1888.....	12,550	14	21,430	45
do do 1889.....	12,576	18	22,313	03
do do 1890.....	19,859	18	20,989	52
do do 1891.....	21,644	72	22,183	76
do do 1892.....	20,994	84	22,736	59
do do 1893.....	25,295	35	24,386	95
do do 1894.....	24,853	47	25,961	36
	388,555	53	415,231	05
Deduct receipts from expenditure.....			388,525	53
Balance to debit of fund.....			26,705	52

The Steamboat Inspection Act was further amended at the last session of Parliament. The details respecting the amendments will be found under "legislation," in this report.

The following list contains the names of the inspectors of boilers and machinery and hulls and equipment of steamboats, viz. :—

Name.	Position.	Address.
Edward Adams.....	Chairman of Board of Steamboat Inspection.....	Ottawa.
M. P. McElhinney.....	Inspector of Hulls and Equipments.....	do
J. J. Olive.....	do	St. John, N. B.
S. R. Hill.....	do	Halifax, N. S.
Vacant.....	do	Toronto, Ont.
Thos. Donnelly.....	do	Kingston, Ont.
P. D. Brunelle.....	do	Quebec, P. Q.
R. Collister.....	do	Victoria, B. C.
John Dodds.....	Inspector of boilers and machinery.....	Toronto, Ont.
J. Johnston.....	do	do
T. P. Thompson.....	do	Kingston, Ont.
Wm. Laurie.....	do	Montreal, P. Q.
L. Arpin.....	do	do
J. Samson.....	do	Quebec, N. S.
D. Stevens.....	do	Halifax, N. B.
H. L. Waring.....	do	St. John, B. C.
J. A. Thomson.....	do	Victoria, B. C.
C. E. Robertson.....	do	Winnipeg, Man.

INSIDE SERVICE.

The following comprises the names of officials and employees engaged in the inside service of the Department of Marine and Fisheries on the 1st July, 1894 :

Name.	Rank.	Salary.
Wm. Smith.....	Deputy Minister.....	\$ 3,600
John Hardie.....	Chief Clerk.....	2,400
S. P. Bauset.....	do.....	2,400
Wm. P. Anderson.....	Chief Engineer, General Supt. Lighthouses and Hydrographic Service.....	2,400
F. Gourdeau.....	Accountant.....	2,200
W. L. Magee.....	Chief Clerk.....	1,850
R. N. Venning.....	First class Clerk.....	1,600
W. H. Alexander.....	do do.....	1,550
W. P. McElhinney.....	do do.....	1,550
A. W. Owen.....	do do.....	1,450
E. Stanton.....	do do.....	1,450
J. S. Webster.....	Second class Clerk.....	1,400
J. B. Kent.....	do do.....	1,400
J. B. Halkett.....	do do.....	1,350
A. H. Belliveau.....	do do.....	1,300
V. C. Nicholson.....	do do.....	1,250
W. W. Stumbles.....	do do.....	1,250
V. H. Steele.....	do do.....	1,250
A. Halkett.....	do do.....	1,150
F. H. Cunningham.....	do do.....	1,150
T. Aumond.....	Third class Clerk.....	1,000
J. A. Murray.....	do do.....	950
J. McClenaghan.....	do do.....	950
D. C. Campbell.....	do do.....	900
R. Roy.....	do do.....	880
B. F. Burnett.....	do do.....	850
W. A. Mackinson.....	do do.....	750
A. H. Guion.....	do do.....	750
J. W. Watson.....	do do.....	550
W. C. Gordon.....	do do.....	500
E. W. Gilbert.....	do do.....	500
M. C. Doyle.....	do do.....	500
C. W. White.....	do do.....	400
John McCharles.....	do do.....	400
J. Morin.....	Messenger.....	500
J. A. Robertson.....	do.....	500

EXTRA CLERKS.

M. Lamouche.....	\$ 2 25 per diem
L. Bance.....	400 00 do annum.
E. McQuarrie.....	25 00 do month
L. Peck.....	15 00 do do

HYDROGRAPHIC SURVEYS.

W. J. Stewart.....	\$ 1,650 00 per annum.
C. F. Cox.....	1,300 00 do
B. H. Fraser.....	800 00 do
F. Anderson.....	700 02 do
L. J. Burpee.....	600 00 do
J. T. Fraser.....	600 00 do

OUTSIDE SERVICE, MARINE BRANCH,

The number of persons employed in the outside service on the 30th June, 1893, was as follows :—

Superintendent of lights and light-keepers, &c., in Ontario and above Montreal	164
Officers of agency in city of Quebec, light-keepers, fog-alarm keepers, crews of light-ships, &c., at and near Montreal, in the province of Quebec.....	170
Agent, clerk, messenger, superintendent of lights, light-keepers, fog-alarm keepers, attendants at humane establishments, &c., in Nova Scotia.....	197
Agent, clerk, messenger, light-keepers, fog-alarm keepers, &c., in New Brunswick.....	112
Agent and light-keepers in Prince Edward Island.....	42
Agent and light-keepers in British Columbia.....	16
Officers and crews of Dominion steamers and vessels, including Fisheries and Protection Service.....	245
Coxswains of life-boats.....	20
Inspectors of steamboats.....	18
Examiners of masters and mates, and clerk to chairman of board.....	14
Officers and servants in marine hospitals.....	23
Shipping masters.....	26
Harbour masters.....	184
Officers of observatories, meteorological observers, &c., receiving pay.....	143
Hydrographers and engineers, at Ottawa.....	7
Receivers of wreck.....	36
Wharfingers.....	124
Making a total of.....	1,503

For the previous year the number was 1,536. In addition to the 1,503 mentioned above, there are 70 registrars of shipping, who act under the direction and control of this department, but are, at the same time, collectors of customs at the various ports of registration, and receive no salary, or fees in their capacity of registrars. There are 93 measurers and surveyors of shipping at certain ports throughout the Dominion, who act as officers of this department, and are remunerated from their fees of office, although, in addition to such office, many of them hold a position in the customs service. Also, in addition to the above, by Orders in Council of the 21st April and 2nd December, 1874, the chief officer of customs at each port in the provinces of Quebec, Nova Scotia, New Brunswick, British Columbia and Prince Edward Island, where no separate shipping office has been established, is to be held and deemed a shipping master, is to receive the fees, make the half-yearly returns to this department, and act in that capacity under its directions.

From the above statement it will be seen that there are 143 officers of observatories, &c., who receive pay for the performance of their duties; but in addition thereto there is a large number of meteorological observers throughout the Dominion who give their services gratuitously.

METEOROLOGICAL SERVICE.

The director, Mr. Carpmael, died in England, on the 21st of October last, and the report of the meteorological service, for the fiscal year ended 30th June, 1894, which forms an appendix to this report was prepared by Mr. Stupart, acting director. Mr. Stupart reports that the interest taken by the general public in the information obtained from the data collected is shown by the increased number of inquiries from the legal, municipal and railway corporations, as well as private individuals. These inquiries entail a large amount of extra work, which is daily increasing.

The demand from persons in Toronto, and at a distance, for special forecasts continues to increase, and in all cases predictions have been furnished at once to those asking for them.

Warnings of approaching storms were issued to railways.

The average number of inquiries regarding the weather by telephone at the Toronto office is about six per day. The number of inquiries by telegraph regarding the weather from outside places in direct telegraph communication with the Toronto office is about ten per week.

No charge is made in Canada for inquiries.

The information relating to forecasts is given to the public gratuitously and a display is made in conspicuous and public places in the various cities of the Dominion, of the forecasts.

The same practice exists in the United States. The forecasts are given as wide a dissemination there as possible for the benefit of all interests affected by weather or temperature changes.

When forecasts are requested for the benefit of the public, they are telegraphed at government expense, but when utilized for the benefit of private interests the telegrams are sent at the expense of the recipients.

The Weather Bureau of the United States is connected with the Department of Agriculture at Washington.

The Meteorological Service of Great Britain is under the management of the Meteorological Council with the registered office in England. The council is an association receiving a parliamentary grant for meteorological purposes and the other sources of income.

Forecasts are supplied for subscribers at ten shillings per annum in addition to the cost of transmission, which may be by letter or book post. By daily telegraph the charge is threepence per day and cost of telegraphy.

Forecasts are supplied to clubs in London for a subscription of ten shillings per annum, and forecasts for public use at a fee of 2s. 6d. for a quarter, in addition to cost of telegrams.

Inquiries as to the weather, made personally or by messenger, are attended to on payment of one shilling. Inquiries by letter or telegram are answered on payment of one shilling.

MAGNETIC OBSERVATORIES.

The annual reports of the director of the Magnetic Observatory at Toronto and the observatories at Quebec, Montreal, Kingston and St. John, are attached to the report on the Meteorological Service. The sum of \$4,968.66 was expended in connection with the Magnetic Observatory at Toronto, and \$500 each for the observatories at Kingston and Montreal. The total amount expended on account of Meteorological and Magnetic Observatory services for the past fiscal year was \$60,472.30.

COASTING TRADE OF CANADA.

By the provisions of chapter 83, Consolidated Statutes of Canada, being an Act respecting the Coasting Trade of Canada, no goods or passengers can be carried by water from one port in Canada to another except in British ships; but the Governor in Council may, from time to time, declare that the Act shall not apply to ships or vessels of any foreign country in which British ships are admitted to the coasting trade of such country, and to carry goods and passengers from one port or place to another in such country. The Parliament of Canada was empowered to pass the Act alluded to under the provisions of the Imperial Act, 32 Vic., chap. 11, intituled: "An Act for amending the Law relating to the Coasting Trade and Merchant Shipping in British Possessions," which came into operation in this country on its proclamation by the Governor General on the 23rd October, 1869.

It was ascertained that the following countries, viz., Italy, Germany, the Netherlands, Sweden and Norway, Austro-Hungary, Denmark, Belgium and the Argentine Republic, allowed British ships or vessels to participate in their coasting trade on the same footing as their own national vessels,—the ships of Italy by Order in Council of the 13th August, 1873; those of Germany by Order in Council of the 14th of May, 1874; those of Netherlands by Order in Council of the 9th of September, 1874; those of Sweden and Norway by Order in Council of the 5th November, 1874; those of Austro-Hungary by Order in Council of the 1st June, 1876; those of Denmark by Order in Council of the 25th of January, 1877; those of Belgium by Order in Council of the 30th September, 1879; and those of the Argentine Republic by Order in Council of the 18th May, 1881, were admitted to the coasting trade of Canada.

MESSENGER PIGEONS.

A report from Captain D. Mills, Royal Engineers, present superintendent of signals, Halifax, forms an appendix to this report. Changes have been made by removing the birds from the loft at the Marine and Fisheries wharf to the citadel signal station.

The results have not been satisfactory in the past owing to the great difficulties to be overcome. One of these was the loss of birds at the loft formerly occupied through mortality and other causes. It has been considered that the effort to establish the messenger pigeon service should be continued until a fair trial is made of the means now in use. A new system with regard to the compensation of the trainer was adopted. He will be paid for the results of his work and according to the number of messages carried from Sable Island to Halifax.

REMOVAL OF OBSTRUCTION TO NAVIGATION.

The sum of \$5,000 was appropriated by Parliament for the removal of obstructions to navigation, and the sum of \$202 was expended during the fiscal year.

Tenders were invited to be received up to the 23rd of April last for the removal of the remains of an old wharf obstructing navigation in Partridge Island River near Parrsborough, N. S. The tender of John Smythe being the lowest was accepted and Mr. Smythe removed the wharf, the cost being \$59. Steps have been taken to reimburse the department.

The removal of the remains of the burnt schooner "Price Brothers" at Apple River, N. S., cost the sum of \$25. The work was done by the harbour master before the owner could proceed to remove the wreck, but no blame could be attached to the harbour master as he was under the impression that directions given him by the agent of this department authorized him to take away the remains of the burnt vessel.

The removal of a portion of the Souris Government pier which had become detached by storms cost \$10 and the work was done by Mr. J. D. Gardiner, who tendered for the work.

INSPECTION OF SHIPMENTS OF LIVE STOCK EXPORTED FROM CANADA.

A report from the inspectors forms an appendix to this report. It will be seen that the total number of cattle shipped in 1894 is greater than for the year 1893, the figures being 86,635 fat cattle for 1894 and 83,322 fat cattle for 1893. The report of the inspectors shows a remarkable increase in the export of sheep and horses. The numbers being 139,780 sheep in 1894 and 3,743 in 1893, while the number of horses shipped in 1894 was 5,623 and in 1893 there were 1,660 shipped.

LEGISLATION.

The following Acts were past last session of Parliament, viz. :—

An Act to amend the Act respecting Lighthouses, Buoys and Beacons and Sable Island.

An Act further to amend the Act respecting Certificates to Masters and Mates of Ships.

An Act to amend the Seamen's Act.

An Act further to amend the Revised Statutes, Chapter seventy-seven, respecting the safety of ships.

An Act to amend the Inspection of Ships Act.

An Act further to amend the Steamboat Inspection Act.

An Act respecting Public Harbours.

An Act to amend and consolidate the Acts relating to the Harbour Commissioners of Montreal.

An Act further to amend the Acts respecting the Harbour of Pictou in Nova Scotia.

An Act to amend the Harbour Masters' Act.

These Acts were assented to 23rd July, 1894, and form an appendix to this report.

I have the honour to be, sir,

Your most obedient servant,

WM. SMITH,

Deputy Minister of Marine and Fisheries.

Department of Marine and Fisheries, Ottawa.

APPENDIX No. 1.

GENERAL SUMMARY of Expenditure for Fiscal Year ended 30th June, 1894.

Service.	Amount.	Total.
	\$ cts.	\$ cts.
Ocean and River Service—		
Maintenance and repairs to Dominion steamers	128,183 97	
Purchase of new steamer "Aberdeen"	50,000 00	
Examination of masters and mates	3,745 33	
Rewards for saving life, &c.	8,014 67	
Investigations into wrecks	350 81	
Registry of Canadian shipping	394 00	
Tidal service	10,172 61	
Removal of obstructions in navigable rivers	202 02	
Winter mail service, Prince Edward Island	6,497 03	
Gratuities to Quebec river police	3,103 00	
		210,663 44
Lighthouse and Coast Service—		
Salaries and allowances of lighthouse keepers	195,026 74	
Agencies, rents and contingencies	17,243 93	
Maintenance and repairs to lights, &c.	230,237 07	
Construction of lighthouses	28,041 93	
Signal service	4,668 93	
Repairs to wharfs	1,007 65	
		476,225 85
Scientific Institutions, &c.—		
Observatory, Toronto	4,968 66	
do Kingston	500 00	
do Montreal	500 00	
Meteorological service	60,472 30	
Hydrographic surveys	31,461 76	
Gratuity to widow of late W. A. Ashe	158 32	
		98,061 04
Marine Hospitals, &c.—		
St. Catharines hospital	287 10	
Kingston hospital	500 00	
Sick and disabled seamen	33,990 71	
Shipwrecked and distressed seamen	2,666 13	
Gratuities to officers of Marine hospitals, St. John, N. B.	960 00	
		38,403 94
Steamboat inspection	25,961 76	
Cattle inspection	1,350 83	
		27,312 19
Salaries and disbursements of fishery overseers—		
Ontario	22,634 37	
Quebec	11,692 82	
New Brunswick	18,522 94	
Nova Scotia	20,420 81	
Prince Edward Island	3,078 55	
Manitoba	2,187 35	
North-west Territories	3,143 94	
British Columbia	5,283 21	
		86,963 99
Fishbreeding		45,024 67
Fishery Protection Service		115,147 59
Brought forward		1,097,802 71

GENERAL SUMMARY of Expenditure for Fiscal Year ended 30th June, 1894—*Concluded.*

Service.	Amount.	Total.
	\$ cts.	\$ cts.
Brought forward.....		1,097,802 71
Miscellaneous—		
Building fishways, &c.....	2,148 67	
Legal expenses.....	4,094 29	
Canadian Fishery Exhibit.....	1,217 63	
Distributing fishing bounty.....	4,624 50	
Oyster culture.....	6,161 04	
International Fisheries Commission.....	1,912 69	
		20,158 82
Behring Sea.....	12,544 74	
do Arbitration.....	46,924 61	
		59,469 35
W. B. Deacon.....		21 00
Licenses to United States fishing vessels.....		462 15
Blasting rock in Lock Lomond.....		996 65
<i>Modus vivendi</i> licenses.....		670 50
Fishing bounty.....		158,794 54
Civil Government Salaries.....	45,014 54	
do Contingencies.....	10,012 14	
		55,026 68
		1,393,402 40

APPENDIX No. 2.

STATEMENT of Revenue of Marine Department for the Fiscal Year ended 30th June, 1894.

Service.	Amount.
	\$ cts.
Casual Revenue (sale of shipping forms, \$134.75 ; sundries, \$55,351.54).....	55,486 29
Capes Mail Service.....	187 50
Dominion Steamers.....	14,460 46
Examination of Masters and Mates.....	2,907 54
Fines and Forfeitures.....	1,915 36
Harbours, Piers and Wharfs.....	9,453 84
Lighthouse and Coast Service.....	6,795 00
Steamboat Engineers' Certificates.....	706 50
Steamboat Inspection.....	24,866 33
Sick Mariners' Fund.....	49,090 85
	\$165,869 67

APPENDIX No. 3.

ANNUAL REPORT OF THE CHIEF ENGINEER.

OTTAWA, 25th January, 1895.

JOHN HARDIE, Esq.,

Acting Deputy Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit a report of the work done in the technical branch of the Department of Marine and Fisheries during the past year.

This branch comprises all the technical work of the department at headquarters. The Meteorological Service at Toronto is not included. The technical work includes the construction and maintenance of lighthouses, lightships, fog-alarms, buoys and beacons; the supervision of construction and repairs to Dominion steamers; construction and repairs to life boats and life boat stations; the administration of the vote for the removal of wrecks and obstructions in navigable waters; tidal and current surveys; hydrographic surveys in Canadian waters; construction and repairs to fish hatcheries; engineering points in connection with the maintenance of fish passes; supervision of surveys of oyster beds; examination of applications for foreshore, wharf and water lots, as they affect the interests of navigation; preparation and publication of notices to mariners and hydrographic notes.

LIGHTHOUSE WORK.

The work done by this office in connection with the construction and maintenance of Dominion steamers, lighthouses and other aids to navigation is embodied and detailed in the report of the Deputy Minister. The work required in connection with the preparation of plans and specifications was done in the draughting room, at headquarters, under the supervision of Mr. C. F. Cox, Assistant Engineer.

The following table will give some idea of the extent and variety of this part of the work of the Branch:—

Description of Design.	Designed.	Copies.
Fog-alarm buildings	1	
Lighthouse, towers and dwellings	15	40
Pole lights	2	3
Shelter sheds	1	2
Illuminating apparatus	2	1
Repairs and additions to light buildings	3	3
Boathouses	2	7
Concrete pier	1	
Buoys		11
Lighthouse reserve surveys	6	68
Charts to show position of dangers, &c.		66
Charts	1	
Steamships	2	14
Furniture, departmental rooms	2	3
Powder magazine	1	7
Bomb signals, derricks, &c.	3	4
Tide gauges	2	6
Oyster beds		6
Fishways	1	3
Boilers	1	6
Wharfs		2
Schooners (prize competition)		14
Explanatory drawings to accompany reports		2
Charts of world showing comparative routes	2	1
Hospital sites		12
	48	290
Total drawings and tracings		338
Specifications written		34
Charts received and recorded		115
Charts entered in chart books		27
Notices to mariners and hydrographic notices (covering 95 localities)		55

TIDAL OBSERVATION WORK.

The work of observing tides and currents in the River and Gulf of St. Lawrence and on the Atlantic coast of the Dominion made substantial progress last year under the charge of Mr. Bell Dawson, C.E. I submit herewith (inclosure B) his report upon the year's proceedings.

It is to be regretted that the smallness of the vote available for this service will prevent full results for all our coasts being obtained promptly, but each year substantially increases our knowledge of the currents and tides, even with the present modest vote. Our officers in British Columbia have been instructed to co-operate with Mr. Dawson in obtaining preliminary data, for use when it will be possible to make a systematic observation of the tides and currents of the Pacific coast.

HYDROGRAPHIC SURVEY OF BAY OF QUINTÉ.

As stated in my report of last year, this survey was completed in the season of 1893, but in consequence of the pressure of other work in the draughting room, it was impossible to complete the chart of the survey as expected.

HYDROGRAPHIC WORK, PACIFIC COAST.

Capt. J. T. Walbran, master of the Dominion steamer "Quadra," on the British Columbia station, was able during the past season to examine many reported dangers in British Columbia waters, and to make small surveys of parts where the admiralty charts appeared to be inaccurate or lacking in details. The result of these examinations has been embodied in notices to mariners, Nos. 3, 35, 41, 45 and 54 of 1894.

HYDROGRAPHIC SURVEY OF GEORGIAN BAY.

During the past season Mr. W. J. Stewart, in the steamer "Bayfield," completed the survey of the Georgian Bay, and is now preparing the last sheet to complete the charting of the waters of the Georgian Bay and north channel of Lake Huron.

The total cost of this survey has been \$215,389.21, but against this amount should be credited a proportion of the cost of the surveying steamer "Bayfield," and of all the surveying instruments and other supplies in possession of the department available for surveys in other parts. The expenditure on this survey during the past fiscal year was \$16,292.48.

HYDROGRAPHIC SURVEY OF THE GREAT LAKES.

The hydrographic survey of the Georgian Bay and North Channel, which was most urgently required, having been completed, it has been decided to continue the work on the remaining Canadian waters of the Great Lakes. The use of deeper draught vessels and the increasing speed of steamers make the demand for reliable charts very urgent. Mr. Stewart was instructed on the completion of the work on Georgian Bay to continue with the coast of Lake Huron, and carried a preliminary triangulation from the gap at Cove Island lighthouse, along the south shore of Manitoulin Island. This work will be required in connection with the survey of the main waters of Lake Huron.

It has, however, been decided to take up the survey of the north shore of Lake Erie next season, both because the quantity of traffic in the lake is important and the coast dangerous, and because the completion of this survey is a preliminary necessity to a correct definition of the international boundary line.

I submit, herewith, "Inclosure A," Mr. Stewart's annual report of work done.

Respectfully submitted.

WM. P. ANDERSON,
Chief Engineer.

OUTSIDE SERVICE, MARINE BRANCH,

The number of persons employed in the outside service on the 30th June, 1893, was as follows :—

Superintendent of lights and light-keepers, &c., in Ontario and above Montreal.....	164
Officers of agency in city of Quebec, light-keepers, fog-alarm keepers, crews of light-ships, &c., at and near Montreal, in the province of Quebec.....	170
Agent, clerk, messenger, superintendent of lights, light-keepers, fog-alarm keepers, attendants at humane establishments, &c., in Nova Scotia.....	197
Agent, clerk, messenger, light-keepers, fog-alarm keepers, &c., in New Brunswick.....	112
Agent and light-keepers in Prince Edward Island.....	42
Agent and light-keepers in British Columbia.....	16
Officers and crews of Dominion steamers and vessels, including Fisheries and Protection Service.....	245
Coxswains of life-boats.....	20
Inspectors of steamboats.....	18
Examiners of masters and mates, and clerk to chairman of board.....	14
Officers and servants in marine hospitals.....	23
Shipping masters.....	26
Harbour masters.....	184
Officers of observatories, meteorological observers, &c., receiving pay.....	143
Hydrographers and engineers, at Ottawa.....	7
Receivers of wreck.....	36
Wharfingers.....	124
Making a total of.....	1,503

For the previous year the number was 1,536. In addition to the 1,503 mentioned above, there are 70 registrars of shipping, who act under the direction and control of this department, but are, at the same time, collectors of customs at the various ports of registration, and receive no salary, or fees in their capacity of registrars. There are 93 measurers and surveyors of shipping at certain ports throughout the Dominion, who act as officers of this department, and are remunerated from their fees of office, although, in addition to such office, many of them hold a position in the customs service. Also, in addition to the above, by Orders in Council of the 21st April and 2nd December, 1874, the chief officer of customs at each port in the provinces of Quebec, Nova Scotia, New Brunswick, British Columbia and Prince Edward Island, where no separate shipping office has been established, is to be held and deemed a shipping master, is to receive the fees, make the half-yearly returns to this department, and act in that capacity under its directions.

From the above statement it will be seen that there are 143 officers of observatories, &c., who receive pay for the performance of their duties; but in addition thereto there is a large number of meteorological observers throughout the Dominion who give their services gratuitously.

METEOROLOGICAL SERVICE.

The director, Mr. Carpmael, died in England, on the 21st of October last, and the report of the meteorological service, for the fiscal year ended 30th June, 1894, which forms an appendix to this report was prepared by Mr. Stupart, acting director. Mr. Stupart reports that the interest taken by the general public in the information obtained from the data collected is shown by the increased number of inquiries from the legal, municipal and railway corporations, as well as private individuals. These inquiries entail a large amount of extra work, which is daily increasing.

The demand from persons in Toronto, and at a distance, for special forecasts continues to increase, and in all cases predictions have been furnished at once to those asking for them.

Warnings of approaching storms were issued to railways.

The average number of inquiries regarding the weather by telephone at the Toronto office is about six per day. The number of inquiries by telegraph regarding the weather from outside places in direct telegraph communication with the Toronto office is about ten per week.

No charge is made in Canada for inquiries.

The information relating to forecasts is given to the public gratuitously and a display is made in conspicuous and public places in the various cities of the Dominion, of the forecasts.

The same practice exists in the United States. The forecasts are given as wide a dissemination there as possible for the benefit of all interests affected by weather or temperature changes.

When forecasts are requested for the benefit of the public, they are telegraphed at government expense, but when utilized for the benefit of private interests the telegrams are sent at the expense of the recipients.

The Weather Bureau of the United States is connected with the Department of Agriculture at Washington.

The Meteorological Service of Great Britain is under the management of the Meteorological Council with the registered office in England. The council is an association receiving a parliamentary grant for meteorological purposes and the other sources of income.

Forecasts are supplied for subscribers at ten shillings per annum in addition to the cost of transmission, which may be by letter or book post. By daily telegraph the charge is threepence per day and cost of telegraphy.

Forecasts are supplied to clubs in London for a subscription of ten shillings per annum, and forecasts for public use at a fee of 2s. 6d. for a quarter, in addition to cost of telegrams.

Inquiries as to the weather, made personally or by messenger, are attended to on payment of one shilling. Inquiries by letter or telegram are answered on payment of one shilling.

The pressure of this head of water occasioned leakage, and the column required to be pumped out frequently. It was accordingly taken up in March last, and strengthened with an outside layer of 3 inch planking and extra ribbing inside. A double layer of shipping felt was placed under the new planking; and it was also thoroughly tarred and caulked, to make it watertight. A large outside ballast box had to be added at the foot of the column to keep it from floating up.

The opportunity was also taken to put in the new form of inlet pipe, specially designed to enable it to be cleaned out easily at any time. This is being put in at all the gauges as opportunity offers.

At St. Paul Island a severe gale occurred on January 13th which damaged the tide gauge. This gale was the worst on record since 1875; a lobster factory on the island twenty-five feet above high water, was completely washed away. After persevering efforts during the remainder of January, the gauge could not be put in working order. It was impossible to reach this station till the opening of navigation at the beginning of May. One of the new recording instruments was taken there at the earliest opportunity (May 12th) but it was found on setting it up that its driving clock was defective, and would not work. As the communication with the island is fortnightly, this occasioned the most unfortunate delay. The clock had to be returned to Halifax for repairs; and after much trouble which interfered also with arrangements for other work, it was not until the middle of August that the station was ultimately put in working order.

The other two recording instruments were immediately inspected; and their defects corrected after several weeks of careful examination. It was fortunate that this was done in time; as one of the instruments was intended for Belle Isle, and any defect would probably have caused the loss of a year's observations at so isolated a station.

NEW TIDE GAUGES ESTABLISHED.

It was intended to complete during this season the system of principal tide-gauges; but as the survey of the currents was also commenced this year, and the funds for both purposes were limited to the amount granted in former years for tidal observations only, it was necessary to curtail the total amount of work. It was only possible therefore to establish two additional stations for the Gulf of St. Lawrence; and the establishment of stations on the Atlantic coast had to be postponed.

The stations most required for the gulf were in the Strait of Belle Isle and at Father Point. The tide-gauge at Belle Isle is for tidal purposes a companion to the one on St. Paul Island; as these command the two entrances by which the tides of the Gulf and River St. Lawrence enter from the Atlantic. It was also essential to have a tide-gauge in the Strait of Belle Isle this season, to furnish tidal data for the survey of the currents. The deep channel of 100 fathoms which runs into the mouth of the Lower St. Lawrence, ends in the vicinity of Father Point; and from there to Quebec the river is relatively shallow, and the tides are more liable to be affected by the winds. The range of the tide which in the Gulf is less than five feet, increases at Father Point to seventeen feet. It can thus be well observed, as all the fluctuations are so much amplified. This is also a meteorological observatory, as well as the pilot station. It is thus a most important and suitable point for a tidal station.

In the Strait of Belle Isle the tide-gauge was erected on the west side of Forteau Bay. The shelter there is fairly good, as the bay is well within the strait; and it has also the advantage of being at the narrowest part. The chief difficulty is to avoid its destruction by ice in winter. The thickness of the ice along the shores of the strait is only limited by the depth of water in which it will float. Hence if a wharf were to run out into six feet of water, it would be struck by blocks of six feet in thickness, and so on in proportion; and these blocks have often an impetus from a heavy sea to help them in their work of destruction. The fishermen's wharfs do not therefore extend into a greater depth than about three feet at low water; and the tide-gauge was placed on a timber crib filled with stone, set at the end of one of these wharfs.

The inconvenience of the shallow water is that the wave motion is so great, that it records itself on the tide diagram, and thus gives considerable trouble in obtaining

the true tide curve. This difficulty was not anticipated ; as according to the best information that could be obtained, a deep water wharf was to be found there. As the materials for the erection of the gauge had to be brought from Nova Scotia, it was not possible to meet this difficulty at the time. The best method of doing so will be to connect a pipe with the inlet by which the water is admitted to the gauge, and lay it out along the bottom into deep water where the wave motion ceases to be felt.

At Father Point the shore between high and low water consists entirely of hard shale rock, running in ridges or reefs parallel with the shore. At the outer side, the reef falls off abruptly to low water mark, and from it a hard clay bottom slopes gradually off into deeper water. There is no shelter, as there is a clear reach of 25 miles in all directions from W.N.W. round by N. to E. ; and in north-easterly directions, from which the worst gales come, the reach is from 45 to 60 miles. In winter there is also heavy ice which drifts up and down with the tide, and forms an ice-shove against the reef to a depth of 20 feet.

In these circumstances the best method to adopt was to sink a well at high water mark to the level of the lowest tides, and to excavate a trench across the reef to admit the tide to the well. The best site for the trench had been selected by the late Mr. Carpmael ; and he had also sunk the well to part of the depth required. The position chosen is immediately to the east of the lighthouse. The length of the trench from the well to low water is 270 feet.

The trench was excavated this season to the level throughout of low water at ordinary spring tides ; and the tide was led to the well by means of piping laid along it. The excavation was done in three sections, the two inner ones being divided off by dams, and the water kept down by a steam-pump. The outer section could only be worked at the most favourable times at low water. The piping used is wooden ; made of sound spruce and fir logs nearly 12 inches diameter, with a bore of 3 inches. As it is laid green, and is constantly under water it is more durable than iron, and second only to brass piping, which was considered too expensive to use. It is jointed with sail cloth saturated with white lead.

The trench is 9 to 10 feet deep for most of its length ; and it would have been very expensive to have given it an additional depth of three feet to reach extreme low water, chiefly on account of the amount of pumping required.

The plan of syphoning between the levels of ordinary and extreme low water was therefore adopted. An air-tap and a special air-pipe are provided to allow any air which may enter the pipe to escape, and thus to keep it constantly filled with water. In the outer end of the trench, the sea surges in so heavily in rough weather that the water is much mixed with air ; and to avoid any trouble from this cause, it was decided to lay an iron pipe out along the bottom for about 100 feet, extending from the end of the main pipe into water which has a depth of about 12 feet at lowest tides. The end of the main pipe is protected by a cement dam which makes the connection between the two pipes accessible ; and it is always possible to renew the outer pipe if necessary.

A length of old boiler is placed vertically in the well to form an open shaft for the tide-pipes, in which heating is provided in the usual way to prevent freezing in winter. The boiler is three feet in diameter, and is lined with wood for additional warmth.

The completion of the excavation and pipe laying have been delayed by gales which have been exceptionally severe this autumn ; but the tide-gauge will probably be in working order within a week or two of the present date.

At the Anticosti station the recording instrument has been replaced by one of improved scale ; and an important alteration has also been made to secure better protection in rough weather. It is not infrequent in heavy gales for the waves to break entirely over the tide-house which contains the instrument.

On account of the importance of St. Paul Island as a tide station, it was thought better to make sufficient expenditure to establish it thoroughly, and to discontinue the observations at the neighbouring station on the Magdalen Islands ; as it also had failed to work in January, and some expenditure would have been required there in any case. A complete outfit remains there which can be utilized for the equipment of a new station.

RECORDS, TIDE TABLES, &c.

During the year, since last December, the record of the tide has been carried forward continuously at Quebec and Anticosti, and also at St. John, N. B., with the exception of six weeks during the alterations to the gauge. The interruption at St. Paul Island reduces the record there to five months. The new gauge in the Strait of Belle Isle has been in operation since August; and it is hoped that the gauge at Father Point will shortly be in working order.

It would have been very desirable had funds permitted to have established a tide gauge at Halifax this season to obtain the Atlantic tides for comparison. It was also ascertained that a record of the Halifax tides had been made during the years 1851 and 1852, and through the kindness of the Admiralty this record was obtained. It should be utilized to extend the basis from which the tide tables for Halifax are calculated, as they now depend on the record taken during two years only, namely, 1860 and 1861. The comparatively small outlay required for this purpose cannot be made at present, however. Since 1891 the tide tables for Halifax have been issued annually by this Department, in the form of a small booklet. Its circulation has not been large, and after correspondence with book-sellers in this country and in Britain, with a view to extending its usefulness, it was eventually decided to supply the tables for publication in two Lower Province almanacs. The tables are accompanied by tidal differences which make them available for the whole Atlantic coast of Nova Scotia.

An attempt was made from the records already obtained, to determine direct tidal differences with long established stations. The tide at Quebec is nearly simultaneous in absolute time with the tide at Dover; and the tide at St. John, N. B., with Brest, which is the best established station in France. Also the tide at Halifax, although earlier than at any of the European ports, is nearly simultaneous with Sandy Hook, at the entrance to New York harbour; which is the best station established by the United States Coast Survey. If such tidal differences could be determined or the law of their variation ascertained, it might save the labour and expense of special calculations for some of our ports. Possibly when a longer record is obtained, this may be done with a better hope of success.

At present the record at Quebec and St. John, N. B., is nearly sufficient for the calculation of preliminary tide tables for these ports. At places where the range of the tide is so great, these tables should show the rise and fall of the tide, as well as the times of high and low water. At Quebec, the rise and fall can be referred to the original low water datum of the Admiralty charts; as the reference bench-mark still exists which was cut on the building of the Department of Marine, at the time the Admiralty surveys were made. At St. John, N. B., there is no bench-mark or other level from which to ascertain with certainty the low water datum adopted in the Admiralty surveys, or in the more recent surveys of the harbour made by the Department of Public Works. It is specially important at St. John, to have a correct low water datum, not only in the interests of navigation, and for such purposes as the construction of slips for repair of vessels, but also because properties are often defined by the low water line. In the absence of any permanent mark to record the results which were before obtained, the only course to take was to commence the work again. A bench-mark was accordingly established on the footing course of the new Custom-house building; and for further security its level was also connected with the foundation course of the Post Office. To this bench-mark the rise and fall of the tide is now referred; and a satisfactory low water datum will thus in time be obtained.

SURVEY OF THE CURRENTS.

The intention of the Department in making this Survey, is to obtain information in the first place regarding the currents to be found along the main routes taken by steamships and sailing vessels through the Gulf of St. Lawrence and off the Atlantic coast. It is not proposed therefore to follow inshore currents in detail. For these purposes, there is very little in the way of existing information that is of value. The information which fishermen and others living along the shores could furnish, although

valuable to smaller vessels in entering local harbours, is of little service for the main purpose in view; as the currents in the open waters in the offing are usually very different from those with which they are acquainted. The larger sailing vessels and steamships themselves are not in a position to obtain such information with sufficient definiteness; as the effect of any current is complicated with lee-way and other circumstances which cannot be eliminated without special observations which they have not the time to make. The vessels which have most opportunity to obtain information of value, are men-of-war, when they cruise regularly on certain courses, and can afford time for special observations; and steamers employed in repairing cables, while grappling, and placing anchored buoys in open waters; as they have thus a fixed point to work from, in determining the direction of the current.

Information even of a cursory character may be of value in cases where a current is constantly in the same direction, without much fluctuation; but as a rule the currents themselves are affected by the tides and winds and therefore require continuous observation at definite positions to ascertain their nature. The winds and barometer are already observed continuously by the Meteorological Service in connection with this Department; and the tidal stations now established, serve to furnish the tidal data required for the survey of the currents, as well as the record of the tides themselves.

It was considered most important at the outset to ascertain the nature of the currents at the two main entrances to the Gulf of St. Lawrence; namely, in the Strait of Belle Isle, and Cabot Strait between Cape Breton and Newfoundland. The most satisfactory plan would have been to place a surveying vessel in each of these straits; to obtain simultaneous observations over a longer period of time. This could not be arranged for want of means; and the best that could be done was to set apart the ss. "Lansdowne" for three months in which it could be spared with least inconvenience from its other duties. It was accordingly decided to divide this time between the two places; taking the months of July and September for the Strait of Belle Isle, in order to obtain as different conditions as possible; and taking August for Cabot Strait, in the hope of obtaining more settled weather for so exposed a position. On the first trip to Belle Isle, materials were taken for the erection of a tide gauge in that strait.

The party consisted of myself, Mr. H. M. McKay, B. A. Sc., and Captain Douglas, R. N. R. Mr. McKay acted as assistant in the survey of the currents, with the help of Mr. R. McKeen for the night work. He also took the meteorological observations. Captain Douglas had charge of the erection of the tide gauge at Belle Isle; and at other times during the season he superintended the alterations at St. Paul Island and Anticosti and the construction of the tide gauge at Father Point. Dr. W. E. Deeks accompanied us in July to obtain information for the Department on the reproduction and propagation of fish. The Captain and officers of the vessel also gave their hearty co operation in facilitating the work.

The general itinerary was as follows:—

June 29.—Left St. John, N.B., calling at Halifax for materials for Belle Isle and at Sydney for coal.

July 6.—Arrived at Forteau Bay, in the Strait of Belle Isle.

July 7 to August 9.—Surveys in the Strait of Belle Isle and vicinity; and erection of tide gauge at Forteau Bay.

August 10 to 12.—Returned to Cabot Strait.

August 13 to 31.—Surveys in Cabot Strait; including also a call at Sydney for coal and supplies.

September 1 to 4.—Second trip to Belle Isle.

September 5 to 25.—Surveys in the Strait of Belle Isle.

September 26 to 29.—Returned from Belle Isle to Pictou; including a call at St. Paul Island, and some work in Cabot Strait.

On the longer trips as much information as possible was obtained. The patent log was first carefully checked against measured runs on the chart, to make sure of its accuracy. It was then used to ascertain the direction of the current by making runs between accurately determined starting and ending points. The actual course steered

was determined from the average of readings taken every 10 or 15 minutes on the binnacle compass, which was one of Sir William Thomson's design. The leeway of the vessel was either eliminated or allowed for.

On arrival at the locality where the definite surveys were to be made, several stations were chosen on the chart as the most advantageous positions for the work, and one or other was taken up according to wind and weather and the shelter to be obtained. The days that were too rough to work at any fixed station, were utilized for temperature work ; which was therefore done with little loss of time available for other purposes.

The data regarding the ss. "Lansdowne" used in the survey are as follows :—

Registered tonnage.....	463 tons.
Gross tonnage.....	680 "
Length of keel.....	180 feet.
Breadth of beam.....	32 "
Ordinary draught.....	13 ft. 6 in.
Horse power.....	80
Maximum speed.....	10 knots.

Area on longitudinal section :—

Above water.....	2,980 sq. feet.
Under water.....	2,160 "

The last items are of importance in connection with the leeway made under given conditions.

METHODS AND APPLIANCES.

In a survey of this character it is desirable to avoid complication with the shore currents, which usually extend a mile or two out. The distance from land is therefore seldom less than 3 to 5 miles, and often 10 to 20 miles or more ; and the best method to adopt is to anchor the vessel, and use it as a fixed point from which to determine the velocity and direction of the current. The most favourable opportunities must be taken while at anchor to determine the position of the vessel itself, either by sights to the shore or astronomically ; and these determinations must be repeated as frequently as possible to make sure that no change in position is occurring from dragging of the anchor. The current itself can then be best measured by means of current meters, supplemented by the use of drift buoys and other methods as occasion offers.

The depths in which it was necessary to anchor ranged from 30 to 40 fathoms in the Strait of Belle Isle, and up to 260 fathoms in Cabot Strait. For these greater depths, wire rope hawser was used ; and as the friction of the water itself is usually counted upon to give a considerable grip to such a length of rope, a comparatively small anchor will hold. On this account also, there is little give in rough weather at the inner end next the vessel ; and it is necessary to provide against the sudden strains due to its motion. The anchor rope was therefore led over a large bow pulley with which the "Lansdowne" is provided ; and an accumulator or compressor was introduced between this pulley and the point of attachment to the vessel, which was carried back nearly amidships. This compressor acted in the same way as an ordinary spring balance, and served to take up the motion of the vessel. It was nearly the same in design as the appliance used on the United States surveying steamer "Blake" and described and figured in the report on the "Gulf Stream Investigations" by Lieut. Pillsbury, Appendix No. 10 to report for 1890, United States Coast Survey. It consisted of a series of 60 rubber discs of 5 inches diameter ; making a total length of 12 feet ; the greatest compression in use reduced its length to 8 feet 8 inches.

The chief difficulty in providing suitable anchorage appliances was the want of funds ; as the amount voted for the survey, was little over half of the estimated expense. The endeavour was therefore made to tide over this first season with the lightest and cheapest appliances. The wire hawser for deep anchorage was handled with the ordinary steam winch already on the vessel ; and considerable trouble and anxiety also resulted from the dragging of the anchors used, much of which might have been avoided with better and heavier appliances. As the currents themselves seldom exceeded two miles

an hour, it took very little to hold the vessel in calm weather. But in heavy winds it was difficult to avoid dragging, which even took place against the current, when the wind and tide were in opposite directions, and the vessel lay broadside to the wind.

These difficulties were also increased by the character of the bottom. In the Strait of Belle Isle the bottom appears to be of the smoothest rock, according to all indications; so much so that it appears plausible to suppose that it has been polished in course of time by the icebergs in the strait. In Cabot Strait the bottom is marked "mud" on the chart; and heavy fine-prong grapnels with wide palms were accordingly tried as mud anchors. But although there is undoubtedly mud in places, the bottom itself is mostly hard. All indications regarding the character of the bottom were carefully noted; and any marine forms brought up on the anchors were also preserved.

The current meters with which the velocity and direction of currents can best be determined, are now usually constructed to register electrically, which is a great advantage, especially for tidal currents which are continually varying in velocity. Such a meter can be used to obtain a continuous record, both day and night if desired, without removing it from the water. These meters are made on two different principles; one kind measures the current by means of a set of small buckets revolving horizontally, on the same principle as an anemometer; and the other consists of a fan similar to a screw propeller or wind-mill, which revolves in a vertical plane. The meter has in either case a tail which keeps its head to the current; and its position in the water thus indicates the direction of the flow. For marine purposes, the horizontal meter appeared to be the most suitable for general use; as it is less affected by the vertical motion of the waves and the rolling of the vessel. The meter on the fan principle is more apt to "head up" and "head down" as the vessel rolls, and so to give an exaggerated record. In this survey, one meter of each of these descriptions was employed.

As a vessel at anchor always lies between wind and tide, and these are seldom in the same direction, it is usually rolling. In the present instance the time in which the "Lansdowne" made a complete double roll in moderate working weather, was from six to seven seconds. In this interval the meter was raised and lowered some two to three feet through the water. When the height of the waves exceeded five to six feet, the rolling was much greater, and the meters could not be depended upon to register correctly. A simple device was eventually adopted to avoid this difficulty; the meter was suspended over the side by a rope which was carried over a large pulley on a davit arm and attached at the opposite side of the deck. A weight was attached to the horizontal part of this rope which depressed it and allowed sufficient give and take over the pulley to compensate for the rolling of the vessel. The electric wires were led independently to the meter.

As these meters have been used almost exclusively for river work, it may be allowable to mention briefly some special points in connection with the use of electric registration for marine purposes. The principle of the registration is simply that the electric circuit is made and broken with each revolution of the meter; and the revolutions are registered by a counter actuated by an electromagnet. The meter contains an "air-chamber" in which the contact can take place; but it was found very difficult to prevent the water from working its way into it. This was overcome by filling the air-chamber with oil, which is sufficiently non conducting to prevent short circuiting, and excludes the water, and should serve also to equalize the pressure at considerable depths. On account of the higher conductivity of sea-water as compared with fresh water, it appears to be essential that there should be no exposed binding posts or other contact with the water on the down circuit. The greatest difficulty was experienced at first from this cause; and it was found necessary to have the down wire completely insulated and all connections inbedded in rubber cement throughout. These alterations made the horizontal meter work successfully, but the meter with the vertical fan had so large an air-chamber and so many binding posts that none of these means were successful; and the attempt to make it work electrically had to be abandoned, and a mechanical counter was attached to it in an extemporized way which served the purpose.

For battery power it is usual to employ dry cells; but for continuous work in tidal currents these are not suitable, as the power decreases too rapidly. This was met by using more cells than were required, and reducing the current by a resistance coil which could be varied from one to ten ohms, to balance the varying tension of the battery. This, however, required constant supervision and manipulation. It is impracticable to use the gravity battery at sea, as the motion would mix the two liquids; but a form of the ordinary zinc-carbon battery was found entirely satisfactory; as the current it gives is very steady and constant.

In a survey of currents, the primary object is to determine the velocity and direction of the surface current with reference to its effect upon vessels. It is therefore necessary to take the draught of the vessel into account, as the motion of the water may not be the same at different depths. The correct depth theoretically would be half the draught of an average vessel. It was found necessary however to lower the meter clear of the keel of the steamer used in the survey; as it usually lay more or less across the current, and the direction of its side might thus influence the direction or velocity of the current. The total depth of water was seldom less than thirty fathoms; and there was little appreciable difference in the strength of the current down to five fathoms from the surface. The draught of the "Lansdowne" was 13 ft. 6 in., and it was therefore decided to adopt a uniform depth of 18 feet (or three fathoms) for the observations of the surface current. At this depth, the meter itself could almost always be seen distinctly, and the direction of the current was shown by its position in the water. This was often at right angles to the position of the steamer, especially when the current was slack about the time of turn, and the steamer was heading to the wind. The direction was also obtained by means of an open triangle of wood weighted along one edge to keep it vertical, and with gauze stretched upon it to give it a hold in the water. This was used as an attached float, and was specially useful to show the direction of the current at night when the meter could not be seen.

The meter which revolved horizontally with the electrical connection for continuous record, was used throughout for the determination of the surface current. It was furnished by Messrs. W. & L. E. Gurley, of Troy, N.Y. The meter with the vertical fan was of German manufacture; and was used for the determination of the undercurrents. The method found most satisfactory was to obtain the speed of the undercurrent as a percentage of the surface velocity, as this could be done without depending on any ratio between the two meters themselves. The meter was allowed to run for half an hour at the standard depth of 18 feet; then lowered to any desired depth for one hour; and then again for half an hour at 18 feet. The readings were taken after each of these runs; and in this way a mean value for the surface velocity was obtained, with which the speed of the undercurrent could be directly compared. The direction of the undercurrent was obtained from the inclination of the line supporting the meter; or by means of a deep fan, as described further on.

The most important advantage in the use of meters was the opportunity to work in all weathers so long as it was not too rough to hold on at anchor. Some of the best results of the season were obtained on wet days, or in dense fog.

A method much used for currents in rivers, is to place a small buoy or float in the water and follow its course by means of sights or bearings to points on shore. In this survey the shores were usually too distant to make this possible except in the clearest weather. The best adaptation of the method was to start the buoy from the steamer while it lay at anchor, and to determine its path by bearings and distances relatively to the steamer itself. In determining undercurrents, two similar floating buoys were used; and from one of them a fan was suspended which presented a large surface to the water, and could be lowered to any required depth. The two buoys were started together; and the difference in motion gave a measure of the amount and direction of the undercurrent. The buoys for this purpose were cylindrical in shape, made of galvanized iron, about the size of two lengths of ordinary stovepipe, and weighted to stand vertical in the water. The object of this form was to avoid undue vertical motion from the waves. Each buoy carried an upright staff with two horizontal discs set exactly five feet apart, which enabled the distance of the buoy to be determined at any moment and

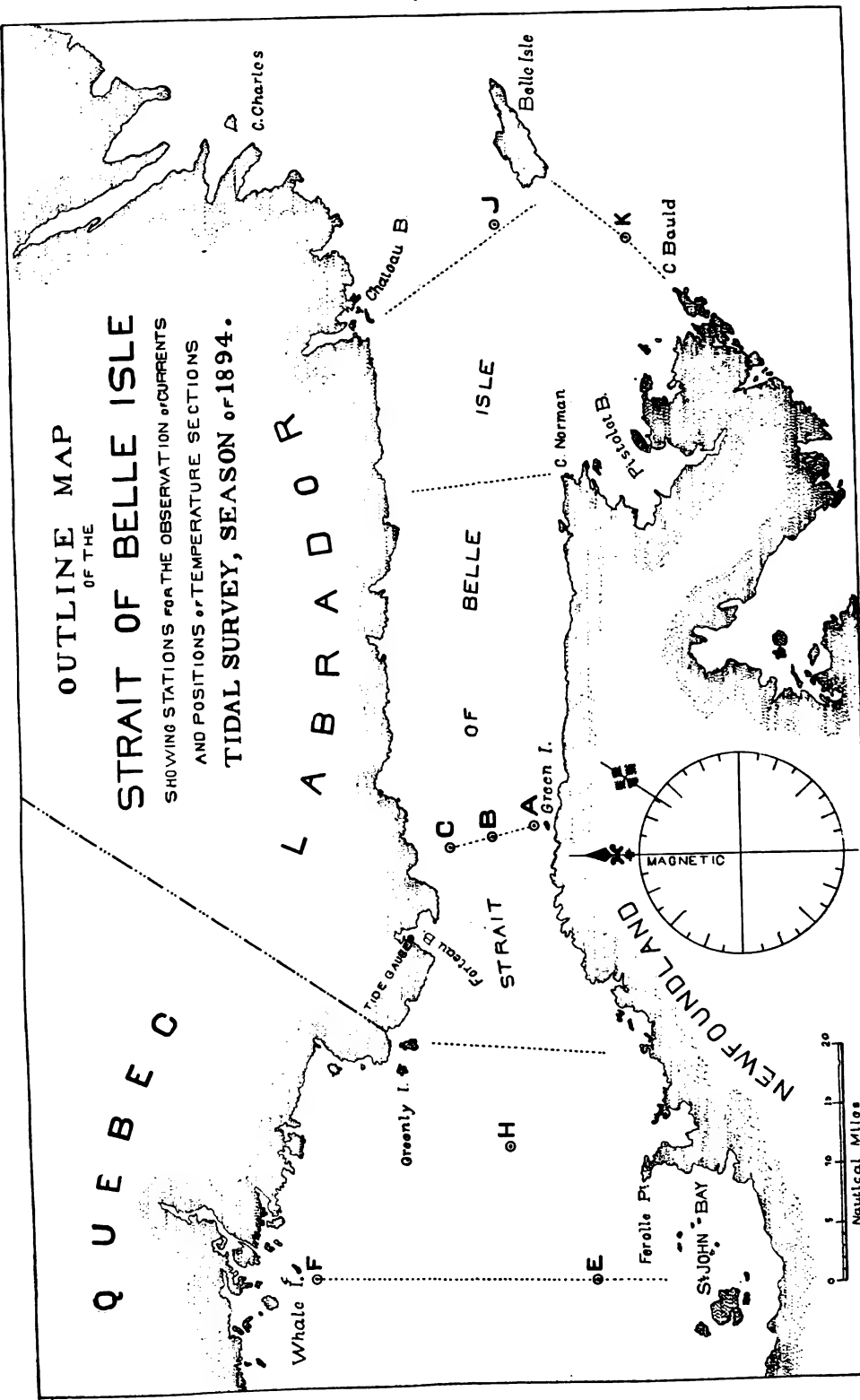
OUTLINE MAP OF THE STRAIT OF BELLE ISLE SHOWING STATIONS FOR THE OBSERVATION OF CURRENTS AND POSITIONS OF TEMPERATURE SECTIONS TIDAL SURVEY, SEASON OF 1894.

Q U E B E C

L A B R A D O R

ISLE OF BELLE STRAIT

NEWFOUNDLAND



from any point of observation by means of a Rochon micrometer telescope. The deep fan consisted of two sheets of galvanized iron passing through each other at right angles, and supported by a light wood frame; the whole being just heavy enough to sink. It was suspended from its buoy by deep sea sounding wire to diminish the resistance of the intermediate water through which it passed. The depths at which it was mostly used were from 30 to 40 fathoms.

These drift buoys and the deep fan were used considerably in the Strait of Belle Isle. The practical difficulty in their use was that a boat was required to place and follow them; and it was usually too rough to use instruments in a boat, except on foggy days when good sights could not be obtained. Some good determinations were made however by this means. The deep fan was also used from the steamer, and the inclination of the line gave a good determination of the relation of surface and undercurrents, especially about the time of the turn of the tide.

During the season, the icebergs in the Strait of Belle Isle were fairly numerous; and every endeavour was made to take advantage of them as "current floats", especially to obtain simultaneous comparisons in different parts of the strait. A large proportion of this work was lost however; as a distant berg might drift further away instead of nearer, or fog might come on to obscure it. The berg might prove to be aground; or it might touch bottom from time to time, and thus be retarded and give a false indication. Also when many bergs were in sight at once, their movements changed their apparent forms, and their identity was lost unless they were very closely observed. These points are mentioned to show the discretion that is needed in estimating the value of reports as to the nature of currents, which are based on the movements of icebergs viewed from a single standpoint and without instrumental measurements.

To obtain complete information from an iceberg, some means had to be found to obtain its actual height in feet. The apparent height was then measured with a sextant or a micrometer telescope, and simultaneous bearings taken, at equal intervals of time; and in this way the path of the berg could be laid down on a plan or chart; and the direction and speed of its motion found. Without the actual height, the observations gave relative results only, with regard to the direction of the current, which were sometimes useful. Any unusual change in velocity, especially when occurring in shallower water as shown on the chart, was taken to mean that it touched bottom or was aground for a time; and these suspected parts of its journey were left out of the comparisons made. The effect of the wind on the movement of an iceberg is scarcely appreciable; as so large a proportion of its bulk is below water. This was not therefore taken into account.

The temperatures of the water were taken with registering thermometers of the Miller-Casella pattern to depths of 40 or 50 fathoms. In greater depths the reversing thermometers of Messrs. Negretti & Zambra were used for reasons that will be explained.

Densities were taken by means of hydrometers with a special range for the purpose. These were chiefly intended to detect any admixture of fresh water in regions where the water was brackish or in the neighbourhood of icebergs.

Meteorological observations were taken continuously while the survey was in progress.

STRAIT OF BELLE ISLE.

To appreciate the importance of this strait as a highway for ocean traffic, an approximate measure of its amount can be obtained from the traffic on the Lower St. Lawrence. The record kept at Father Point shows that during the present season there passed in each direction on the average 98 steamships per month, with an aggregate tonnage of 156,650 tons (registered), representing an actual carrying capacity of fully 50 per cent more than this. The traffic per month through the Strait of Belle Isle is nearly equal to this, as nearly all these steamships pass also through the strait during the months it is open; and the figures do not include any sailing vessels, which pass almost always south of Newfoundland.

The strait itself has a width of 10 to 12 miles for 35 miles of its length; and is entirely free from any rock or shoal throughout. It lies east and west (magnetic.) The north shore is bold and the water off it is deep; the south shore is low, but dips off rapidly into about 30 fathoms. Foggy weather is not infrequent, even in the summer time; and it may be of service to note some points regarding its character, based on observations during July and September. The fog never lifts, but always clings closely to the water. This appears to be due to the low temperature of the water itself. The invariable way in which it clears, is by drifting off before winds from good directions. The best clearing wind is from the north (magnetic) and the statement in the Sailing Directions that all winds with northing in them are clearing winds, may be taken to represent the probabilities in the case. As the northern side of the strait is thus the first to clear, vessels will obtain any advantage there is to be had by keeping to that side.

There is a wide-spread impression that the current in the Strait of Belle Isle runs constantly inwards; and on some physical maps, and also on the weather charts issued by the meteorological department, this is definitely represented. A branch from the Arctic current which runs southward along the outer coast of Labrador, is shown to run in at Belle Isle and to find its way out again through Cabot Strait to the Atlantic. On the other hand the fishermen along the coast seem to believe that the current is usually in the same direction as the prevailing wind at the time. The remark on the Admiralty chart is as follows:—"The movements of the water in Belle Isle Strait are made up of a general westerly set affected by tidal streams and winds. The resulting set may be in either direction." This remark gives little countenance to the theory of a constant inward flow; and it is in itself sufficiently non-committal to cover almost any conditions.

The idea of a constant inward flow appears to be based on the drift of icebergs; and as they are most usually seen drifting inwards it has been inferred that this is the constant direction of the current. The converse of this is however much nearer the truth; and it may be stated in general, that when icebergs are numerous at the outer end of the strait around Belle Isle, and are also found within the strait, this indicates that the direction of the current has been predominantly inwards from the eastward during the few days previous; while the absence of icebergs indicates a current predominantly outwards from the westward. This refers to the presence or absence in the strait of floating bergs, and not to the presence of bergs which may be aground near either shore. It is also to be noted that only a very small percentage of the bergs off the outer end of the strait ever enter it. Captain Vaughan, who resided four years on Belle Isle, states in a pamphlet on the subject that for ten icebergs which enter the strait there are fifty that pass the mouth and go southward. In doing so they follow the general drift of the Arctic current which passes Belle Isle; and the larger bergs also ground at the entrance to the strait. A section of the strait on a line north from Cape Norman shows no depth exceeding 50 fathoms. The largest berg which was seen this season at the outer end of the strait was aground in 59 fathoms of water off Chateau Bay. Its dimensions above water were as follows:—Length, 790 feet; width, 290 feet; height, 105 feet. This may therefore be taken as beyond the limiting size of bergs which can enter the strait.

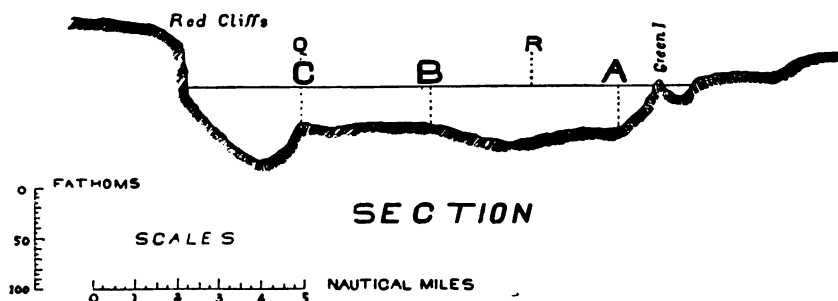
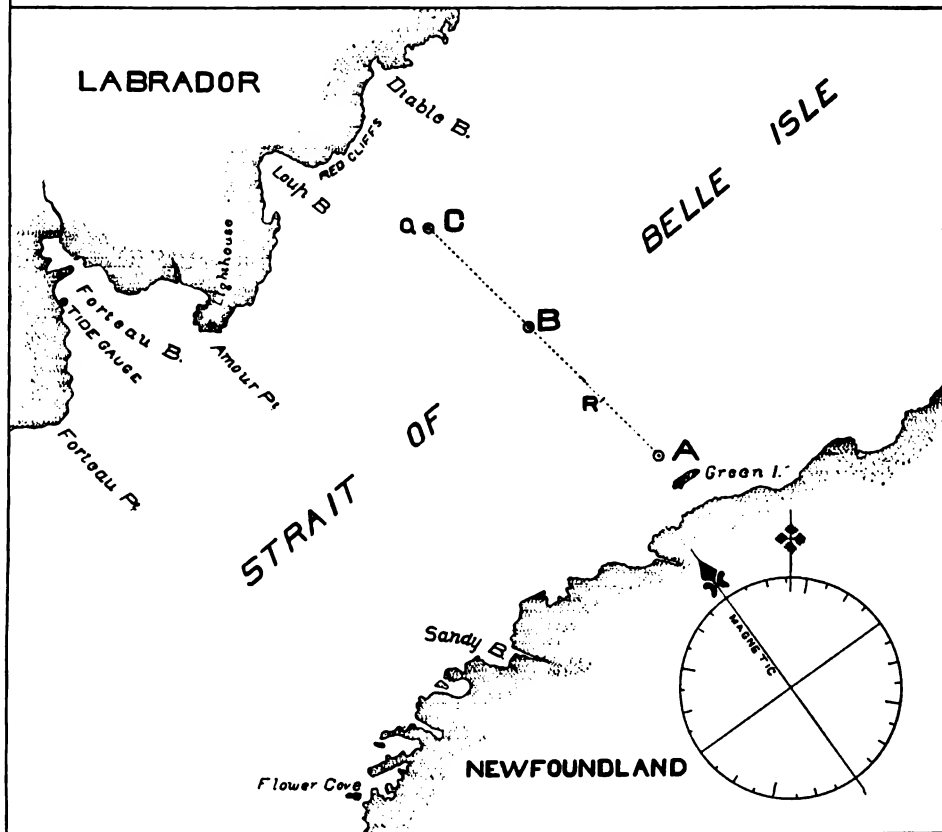
It may be stated in general terms that the current in the Strait of Belle Isle was found to be fundamentally a tidal one. The best comparisons of the current with the tides showed a complete correspondence between the two, especially during the prevalence of moderate westerly winds. On some occasions there were several days during which the current ran east and west for an equal length of time in each direction and turned regularly in correspondence with the rise and fall of the tide. This may therefore be considered as the normal condition of the current. With a heavy and long continued wind the current would first run for a longer time with it and a shorter time against it; and eventually would run continuously in the same direction as the wind, with a fluctuation in velocity corresponding to the tide. This continuous current might be in either direction according to the direction of the wind.

The direct effect of the wind in raising the waves appears also to be unusually great in this strait. The best example observed is briefly as follows:—September 14, morning,

NORTH - EASTERN ENTRANCE TO THE GULF OF ST LAWRENCE

STRAIT OF BELLE ISLE

SHOWING STATIONS OCCUPIED IN SURVEY OF CURRENTS
SEASON OF 1894.



calm, clear and smooth; barometer, 30.34 and nearly steady. During forenoon, wind sprang up from the south-west and increased by 2 p.m., to 35 miles per hour. At 4 p.m. waves were 6 to 7 feet high and 90 feet crest to crest. The total mileage of wind which produced these waves was 182 miles or an average of 30 miles an hour during six hours. Depth of water 40 fathoms. The disturbance due to waves of this height would probably not extend to more than a fourth part of this depth.

In this strait also, where the range of the tide is only about four feet, and the current seldom exceeds two knots per hour, the effect of the wind upon the current is all the more marked in proportion.

It must not be too hastily assumed however that the wind alone is the cause of the movement of the water in the same direction; as it appears probable that the tendency of the current to flow in the same direction as the wind, is due to the combined influence of the wind itself, and to difference in barometric pressure over wide areas. When the pressure is exceptionally high or low over a large area like the Gulf of St. Lawrence, the effect should be all the more noticeable, as the corresponding flow has to take place through comparatively narrow entrances or straits. It is also to be expected that the direct effect of the wind itself would be to produce primarily a surface drift; while difference of pressure would cause a more even flow throughout the whole depth. Hence to distinguish between the effect of the wind and barometer, it would be necessary to investigate fully the relation between the surface velocity and the undercurrent throughout the whole range of varying conditions.

CURRENTS IN THE STRAIT AS OBSERVED.

The current in the Strait of Belle Isle was examined in both July and September at its narrowest part near Amour Point. To avoid the tide rips which occur off this point, a section was chosen a little to the eastward, on a line from Green Island at the south side, to the red cliffs on the north shore which lie immediately east of Loup Bay. The width of the strait is there $11\frac{1}{2}$ miles; and three stations were chosen on the section, station A at one mile off Green Island; station B in the centre; and station C three miles from Red Cliff. The position of these stations and the section of the strait are shown on the plan herewith. The usual depth is 30 to 40 fathoms; but the water is much deeper near the north shore. The bottom appears to be bare rock running in ridges parallel with the direction of the strait. The steamer was anchored at these stations for one or two days at a time; and was moved from one to another to ascertain any difference in the current at the two sides of the strait while the same conditions of wind and weather prevailed. The tides were observed simultaneously at Forteau Bay, within 12 miles of these stations. In July the times of high and low water only were noted; but in September after the tide gauge was erected there, a continuous record day and night was obtained for both tides and currents; although the latter was much interrupted by bad weather. In September only two stations were taken up; one (station Q) being coincident with C; and the other (station R) intermediate between A and B.

Comparisons of the current on the north and south sides of the strait were made by the best means available, to detect any difference between them. The best simultaneous observation of the currents on the two sides was obtained on 15th September, at station R, three miles off Green Island, while an iceberg was drifting up and down with the tide four miles from the north shore. At that time the current was running east and west in fair harmony with the tides; and complete data were obtained from the iceberg, as its height was measured immediately afterwards. The results were as follows:—

(Morning: current inward from the East.)

Turn of current at Station R at 11.15.

Turn as shown by iceberg at 12.15.

(Afternoon: current outward from the West.)

Turn of current at Station R at 16.45.

Turn as shown by iceberg at 16.15.

(Evening: current inward from the East.)

The current on the north side of the strait thus ran inwards from the east for a longer time than on the south side; and outwards from the west for a shorter time. Also, on the north side, the current from the east as shown by the path of the iceberg, was stronger than the current from the west, while on the south side the currents were practically equal in the two directions. Also, during a period of persistent current from the east (8th September), observations at station C, at the north side, compared with the speed of icebergs near the south shore, showed that the current was practically equal at the two sides of the strait.

From these observations, and also from a comparison of the current as measured successively at the different stations, it appears that there is on the whole a tendency on the south side to greater tidal regularity, and on the north side to greater persistency of flow in one direction or the other. This is probably due to the greater depth on the north side, and consequently the greater momentum of the water there, as compared with the frictional resistance.

With this explanation regarding the amount of difference in the current on the two sides of the strait, we may proceed to a closer comparison of the relation between the tides and currents, based upon observations during such times as the current ran in harmony with the tides, and turned in regular correspondence with them. Also, the best instances that were observed of a persistent or predominant current for several days, from the east or west respectively, and the conditions under which this took place.

The tide itself, as recorded at Forteau Bay, has a range which does not exceed four feet. The difference between the spring and neap tides is not usually noticeable; while on the other hand, when the moon's declination is great, the diurnal inequality in the tides is quite distinct. The currents in the strait show the same characteristics; there is no distinct difference in the velocity at spring and neap tides, as the currents are much more disturbed by the winds than any such difference would amount to. But the diurnal inequality in the current is well marked when this inequality occurs in the tide itself. The greatest velocity of the current in either direction under ordinary conditions does not exceed two knots per hour.

The dates during which the currents followed the tides with the greatest regularity, and the conditions of weather then prevailing, are given below. The directions of the wind are magnetic, as these correspond best with the direction of the strait itself. The magnetic variation is 35° W.

Monday, July 9 to Friday, July 13. Wind moderate; from the west or variable in direction. During the four days there were 60 hours westerly wind, averaging 9 miles per hour.

Thursday, July 26 to Saturday July 28.—During two days previous (July 24 to 26) there were 36 hours of westerly winds averaging 15 miles per hour; and 12 hours of easterly and variable winds averaging 14 miles per hour. From July 26 to 29, winds from N. W. to S. W. for 54 hours, averaging 15 miles per hour.

Monday, September 17 to Friday, September 21.—Including the two days previous, or in all from September 15 to 21, there were 72 hours of westerly winds, averaging 15 miles per hour; and 72 hours of easterly winds averaging 8 miles per hour.

The following summaries show the velocity of the current in the two directions, which in these periods is nearly equal; and also the relation between the times of high and low water at Forteau Bay, and the turn of the current in the strait, as observed at stations on the line ABC.

Velocity of the Current.

July 9 to 11 at Station A.

July 12 and 13 at Station B.

Current from east, maximum: 1.16 to 1.98 knots per hour.

Current from west, maximum: 1.30 knots per hour.

July 26 to 28 at Station B.

Current from east, maximum: 1.80 to 1.98 knots per hour.

Current from west, maximum: 1.08 to 1.26 do

September 17 to 21 at Station C.

Current from east, maximum : 1.02 to 2.04 knots per hour.

Current from west, maximum : 0.92 to 1.81 do

The inequalities of the current in the last instance correspond with the diurnal inequality in the tides themselves.

Comparison of Currents with Tides.

During the periods of the greatest regularity as above. (The time is standard time for 60th meridian. In July, the time of H. W. and L. W. is from observation only. In September it is taken from the self-registering tide-gauge.)

Date.	Tide.	Direction and Turn of Current.
	H. M.	H. M.
July 9.....	H.W. at 14.15.....	Current ran from the E. for 1.45 after H.W.
do 10.....	L.W. at 8.30.....	do W. do 2.30 do L.W.
do 10.....	H.W. at 17.00.....	do E. do 0.00 (at H.W.)
do 11.....	L.W. at 10.05.....	do W. do 2.35 after L.W.
do 11.....	H.W. at 17.35.....	do E. do 1.55 do H.W.
do 12.....	L.W. at 11.20.....	do W. do 2.55 do L.W.
do 12.....	H.W. at 19.20.....	do E. do 0.40 do H.W.
do 13.....	L.W. at 12.15.....	do W. do 2.15 do L.W.
July 26.....	H.W. at 15.30.....	do E. do 2.30 do H.W.
do 27.....	L.W. at 10.50.....	do W. do 0.40 do L.W.
do 27.....	H.W. at 16.45.....	do E. do 2.30 do H.W.
do 28.....	H.W. at 5.15.....	do E. do 0.15 do H.W.
do 28.....	L.W. at 11.45.....	do W. do 1.15 do L.W.
do 28.....	H.W. at 17.35.....	do E. do 2.55 do H.W.
do 29.....	H.W. at 7.00.....	do E. do 0.00 (at H.W.)
Sept. 17.....	H.W. at 11.00.....	do E. do 1.30 after H.W.
do 17.....	L.W. at 16.50.....	do W. do 2.30 do L.W.
do 17.....	H.W. at 23.00.....	do E. do 1.30 do H.W.
do 18.....	L.W. at 5.45.....	do W. do 1.15 do L.W.
do 18.....	H.W. at 12.00.....	do E. do 2.30 do H.W.
do 19.....	H.W. at 12.50.....	do E. do 1.40 do H.W.
do 19.....	L.W. at 18.45.....	do W. do 1.30 do L.W.
do 19.....	H.W. at 23.55.....	do E. do 2.35 do H.W.
do 20.....	L.W. at 6.55.....	do W. do 1.05 do L.W.
do 20.....	H.W. at 13.15.....	do E. do 2.15 do H.W.
do 20.....	L.W. at 19.55.....	do W. do 2.05 do L.W.
do 21.....	H.W. at 1.15.....	do E. do 2.15 do H.W.
do 21.....	L.W. at 7.30.....	do W. do 1.00 do L.W.

FURTHER COMPARISON of Currents with Tides during the same periods of greatest regularity. Direct comparisons with time of moon's transit ; in Standard time for the 60th meridian.

Date. 1894.	Tide after Moon's Transit.		Turn of Current after Moon's Transit.	
	H. W.	L. W.	From E. to W.	From W. to E.
July 9	8.47		10.32	
do 10		14.40		17.10
do 10	10.47		10.47	
do 11		15.29		18.04
do 11	10.36		12.31	
do 12		15.58		18.53
do 12	11.35		12.15	
do 13		16.06		18.21
July 26	9.19		11.49	
do 27		16.14		16.54
do 27	9.42		12.12	
do 28	9.43		9.58	
do 28		16.13		17.28
do 28	9.34		12.29	
do 29	10.27		10.27	
Sept. 17	9.40		11.10	
do 17		15.30		18.00
do 17	9.18		10.48	
do 18		16.03		17.18
do 18	9.55		12.25	
do 19	9.56		11.36	
do 19		15.51		17.21
do 19	8.36		11.11	
do 20		15.36		16.41
do 20	9.29		11.44	
do 20		16.09		18.14
do 21	9.00		11.15	
do 21		15.15		16.15
Means.....	9.47	15.45	11.27	17.33
Mean interval after High Water.....			1.40	
do do Low Water.....				1.48

At other times the current was often much more persistent in one direction or the other. The most marked example of a persistent current running out of the Strait from the westward was as follows :—

Monday, July 16th to Thursday, July 19th. During these three days the current as observed at station C, ran in from the east for only 5 hours and out from the west for 19 hours each day. The maximum velocity of the current from the east was 1.38 knots per hour ; and from the west 2.44 knots per hour. The long run from the west was stronger at the beginning and end of the time, with an interval of weaker flow between the two. The times of high water corresponded with this minimum in the current from the west, and with the maximum current from the east. This condition of the current may therefore be considered as consisting of two components ; a steady flow from the west, together with the usual tidal current in the two directions. As the moon's declination was at its maximum at the time, the diurnal inequality would largely account for the difference between the actual current from the east at the one tide, and the minimum of the current from the west at the other.

The best example of a persistent current running in through the strait from the eastward occurred from Wednesday, September 5th to Saturday, September 8th. All the indications concurred in showing that the current ran continuously in the one direction during these days ; although the observations were much interrupted by bad

weather. There were also about a dozen icebergs seen in the strait during this time; and their motion agreed with the regular observations, in showing that the current ran continuously inward from the east. The current as observed at station C, varied from a minimum of 0.54 knots per hour to a maximum of 3.15, in the one direction. The tides themselves were anomalous; as the low water for five successive tides scarcely fell below mean sea level, and the whole rise was less than two feet, or about half the usual amount.

In stating the conditions of wind and barometer during these periods of predominant flow, it may be well to recall that a difference of barometric pressure should tend to produce flow from the higher towards the lower pressure, just as in the case of the wind.

At the time of the predominant flow from the westward, (July 16th, to 19th), the wind ranged from N. W. to S W. For three days previously, from July 13th to 16th, the average for 72 hours was 16 miles per hour; and from July 16th to 18th, the average for 60 hours was 14 miles per hour from the same direction. This was succeeded by easterly winds and broken weather. Also, from the morning of the 14th the difference of barometric pressure gave a barometric gradient which was inwards at Cabot Strait and outwards at the Strait of Belle Isle. This continued till the evening of the 17th when the pressure equalized itself; and by the morning of the 19th a low pressure area developed over the gulf which gave inward gradients at both straits and thus reversed the conditions for Belle Isle. The effects of both wind and barometer are thus in general accord with the direction of the current from the westward. It will also be noted that the total mileage of westerly wind in the case of this predominant current, is nearly double of its greatest amount during the periods when the current ran in harmony with the tides.

During the continuous flow from the east (Sept. 5 to 8) the conditions of wind and barometer were disturbed and complicated, as a storm centre was passing over the northern part of Newfoundland at the time. The low pressure area of this storm centre was over the gulf during the 5th and was nearest to the strait on the morning of the 6th, on its way eastward to the Atlantic. From the morning of the 5th till the evening of the 8th there were 60 hours of N. N. W. wind averaging 25 miles per hour, and rising at times to 45 miles. During the remainder of the time the winds were light and variable. The relation of wind and barometer to the current at this time is not clear; beyond the general fact of the occurrence of a severe disturbance at the time of this continuous current.

The features of the current in their relation to the winds and the tides might be illustrated by diagrams were there time to prepare these for this report.

Under-currents.—The under-currents in the Strait of Belle Isle were carefully observed at a depth of 25 to 30 fathoms by the methods already described, and also by obtaining the speed of icebergs, which served as "deep floats" for comparison with the surface velocity. The undercurrent would have had much greater importance if the current through the strait had proved to be a continuous one, for which an actual gauging of volume was required.

During the times that the current ran in fair correspondence with the tides, when the conditions may be considered as normal, the undercurrent was usually stronger than the surface current when the flow was from the east, and it was always weaker than the surface current when the flow was from the west. From the best ratios obtained while the current ran steadily, and omitting observations near the turn of the tide, the following percentages have been obtained:—

Current from the east. Undercurrent 5 per cent stronger than the surface current.

Current from the west. Undercurrent 70 per cent of the velocity of the surface current.

During the period of predominant current from the westward (July 16-19) the undercurrent ran with much greater regularity in the two directions than the surface current. This indicates that the surface current itself was of the nature of a "wind drift," and that the time was not sufficiently prolonged for the wind to influence the current to the bottom.

During the period of persistent flow from the eastward (Sept. 5 to 8) the under-current was decidedly stronger than the surface current, amounting on the average to nearly 20 per cent more. This result was obtained chiefly from the motion of icebergs.

TEMPERATURES.—The temperature of the water was taken to ascertain its relation to the direction of the current through the strait; as the water at the Atlantic end of the strait is colder than the water at the western end towards the Gulf of St. Lawrence. It was therefore to be expected that the current running in from the east would be the colder of the two; and the temperature of the water might thus furnish an indication to vessels of the probable direction of the current. The temperature sections as tabulated below, were taken across the strait from surface to bottom, from Belle Isle itself to nearly as far west as Rich Point. The columns represent a series of points at equal intervals across the width of the strait from north to south. The temperatures are Fahrenheit.

Temperature Sections, at outer end of Strait of Belle Isle. On a line running S.E. (magnetic) from Chateau Bay to Belle Isle, August 7th, 1894. Current at the time from N.N.E. (magnetic) velocity at Station J, 1.00 knot per hour. Icebergs numerous at the time.

CHATEAU BAY TO BELLE ISLE.

Surface	37°	—	39°	39°	43°	41°
10 fathoms.....	35	38	38	38	41	35
20 do	31	33	32	33	32	32
25 do	—	—	—	31	31	—
30 do	—	31	31	—	—	30
35 do	—	—	—	30	—	—
40 do	—	30	30	—	—	—
Total depth.....	25 F.	55 F.	90 F.	41 F.	30 F.	40 F.

Section on a line running S.W. (magnetic) from Belle Isle to Cape Bauld, August 9th, 1894. Current at the time N.N.W. (magnetic) velocity at station K, 1.15 knots per hour. Icebergs numerous near Belle Isle.

BELLE ISLE TO CAPE BAULD.

Surface	37°	42°	40°	42°	52°
10 fathoms.....	35	35	35	42	51
20 do	31	32	32	35	44
30 do	30	30	31	32	36
40 do	—	30	30	31	33
Total depth.....	41 F.	43 F.	60 F.	54 F.	50 F.

Temperature section across Strait of Belle Isle, on a line running magnetic south from Wreck Bay to Cape Norman, August 6th, 1894. Current at the time probably running in from the eastward.

WRECK BAY TO CAPE NORMAN.

Surface	37°	41°	41°	49°	53°
10 fathoms.....	37	41	41	42	52
20 do	32	30	31	42	44
25 do	30	—	31	—	—
30 do	—	30	—	35	—
Total depth.....	35 F.	38 F.	42 F.	38 F.	22 F.

Temperature section at the west end of the Strait of Belle Isle, on a line running magnetic south from Blanc Sablon Bay to Ste. Geneviève Bay, August 3rd and 4th, 1894. Current from the west.

BLANC SABLON TO STE. GENEVIEVE BAY.

Surface.....	52°	54°	53°	53°	54°
10 fathoms.....	41	49	53	53	53
20 do	39	43	47	52	53
30 do	38	39	42	49	52
40 do	38		39	46	
Total depth.....	48 F.	38 F.	56 F.	52 F.	38 F.

Same section as above ; repeated September 13th. Current at the time probably from the eastward.

Surface.....	40°	41°	44°	47°	49°
10 fathoms.....	39	40	43	46	48
20 do	38	38	37	44	46
30 do	37	36	36	37	

Temperatures west of the Strait of Belle Isle. Section on a line running magnetic south from Whale Island (Esquimaux Islands) to St. John Bay, between stations E and F, August 1st, 1894. Surface current from the west.

WHALE ISLAND TO ST. JOHN BAY.

Surface.....	53°	50°	51°	52°
10 fathoms.....	51	49	43	51
20 do	41	41	36	38
30 do	39	38	33	34
40 do			32	33
50 do	36	32		
85 do	35	30		
Total depth.....	110 F.	100 F.	55 F.	40 F.

Same section as above ; repeated September 25th. Current slight ; direction not ascertained.

Surface.....	51°	45°	47°	49°
10 fathoms.....	50	44	45	46
20 do	41	35	38	40
30 do	37	33	34	35
40 do	33	33	33	33
50 do		32	32	

Temperatures at Station G, 19 miles N.W. of Rich Point, and 24 miles west of above section. August 2nd, 1894. Surface current from the west.

Surface.....	52°	10 fathoms.....	38°
5 fathoms.....	51	20 do	32
7 do	44	28 do	31
8 do	40	Total depth = 33 F.....	

The following temperatures at the middle of the strait at station B, may be given for comparison with these temperature sections. They give a good average, being at the centre of the strait ; and they were taken as nearly as possible at the same dates as given above. The lower temperatures in September are probably due to the continuous current from the eastward, shortly before that date, and also to the presence of icebergs.

Station B.	July 28.	Sept. 12.
Surface.....	53°	39°
10 fathoms.....	52	39
20 do	40	37
30 do	37	37

These temperature sections show that the water at the eastern end of the Strait is distinctly colder than at its western end towards the gulf. It is therefore to be expected that the current from the east should be the colder of the two. It will be seen from the following examples that the difference is appreciable although very slight. These examples are selected from the numerous observations taken in the central part of the strait (Stations A, B, C), and show the greatest differences observed during periods when the current was running regularly with the tides. The temperatures were taken at slack water after the flow from the east or the west respectively.

Station A, July 11.	After current from the E.	After current from the W.
Surface.....	46°	48°
10 fathoms.....	45	45
20 do	37	41
30 do	33	36

Station B, July 25 and 26.	After current from the E.	After current from the W.
Surface.....	46°	51°
10 fathoms.....	45	51
20 do	40	45
30 do	35	37

The difference is naturally more marked during the periods of predominant flow in one direction, already mentioned. After the period of predominant flow from the west, the temperatures were higher for the average of the whole depth than at any other time :—

Station A July 21	Surface.....	50°	20 fathoms.....	44°
	10 Fath.....	47	30 do	41

The lowest temperature was found on September 8th, after three days of continuous flow from the east. The surface temperature at Station C was then 37°.

These observations show that there is little appreciable difference in the temperature of the currents in the two directions so long as the current maintains its tidal character. The difference between the temperatures to the west of the Strait, at the dates given in August and September deserves, however, a few words of explanation, as it appears probable in the circumstances that the difference is as great as would ever occur in the summer season.

From July 24 to 31 there were in all 124 hours of westerly wind averaging 20 miles per hour, and only 48 hours of easterly wind averaging 19 miles per hour; or in all 2,530 miles westerly wind, and 890 miles easterly wind. The westerly winds also continued during August 1 and 2. The stations E, F, and G, were occupied between July 31 and Aug. 3 immediately after these prolonged westerly winds; and the current was found to be from the west at all three stations, with a velocity of somewhat over one knot per hour at E and F, and three-quarters of a knot at G, as observed in the early part of the afternoon on three successive days. It was also found that the thickness of the layer of water which was in motion from the west corresponded closely with the surface layer of higher temperature, which ranged from 5 to 10 fathoms in thickness at these stations.

These conditions explain the higher temperature of the water at the time; and it is also probable after so much westerly wind, that the current at E and F had as high a velocity as it is ever likely to attain from a westerly direction. The clear width here between the mouth of St. John Bay and Esquimaux Islands is 32 miles.

The low temperatures of Sept. 13 on the section at Blanc Sablon must be attributed to the current which ran predominantly from the east for some time previous to that date. We thus have an example of the cold water occupying the whole Strait to its western end.

It is thus clear that during periods of predominant flow in one direction, the difference in temperature is well marked; and it might perhaps be possible to ascertain from extended observations the amount of the difference to be expected under such conditions, above or below the normal temperature for the season. But at best, the temperature could only be taken to indicate the predominant direction of the current during the few days previous, and could not be relied upon to show its actual direction at the time.

The temperature of the water has a more important relation to the presence of ice in the Strait. When the predominant direction of the current is inward from the east for a few successive tides, it will undoubtedly carry icebergs into the strait if there are any at its outer end at the time. The current from the east is thus not only cold in itself, but also brings in ice with it which further chills the water in the strait. The cold water, the current from the east, and the presence of icebergs within the strait are thus concomitants of each other.

It is not to be inferred however that warm water in the Strait is an indication that ice will not be met with; because the water in the Strait itself may be relatively warm, notwithstanding that icebergs are numerous at its mouth around Belle Isle, and possibly as far in as the vicinity of Cape Norman. It is possible for this ice to be moving southward with the general Arctic current on both sides of Belle Isle, past the mouth of the strait, without affecting either the direction of the current or the temperature of the strait to any great distance inwards.

The following statement with regard to the current in the Strait of Belle Isle at other seasons of the year, is based on information furnished by Mr. T. M. Wyatt, who has been light-keeper at Amour Point for 15 years; and by Mr. Charles Davis, a resident of Forteau Bay. In the spring of the year, the prevailing winds are easterly, and the current also runs in continuously from the eastward, and only slacks with the tide without turning. The duration of this easterly current varies from year to year, but usually continues for one or two months in the interval between the beginning of April and the end of June. A strong west or north-west wind however, will make the current run from the westward. In summer, the currents are less strong and not so persistent, and are more under the influence of the tides. In the autumn, the winds are often easterly in the latter part of September and October; but perhaps more often westerly; and in either case, the current is influenced by their direction. Later in the autumn, north-west winds occur with colder weather. These winds continue to be prevalent during the winter months, and give the current a set from the westward.

This statement must be qualified by the usual uncertainties attributable to the weather; and it is also to be noted that the currents are more persistent on the north shore where these observations were made. The residents on the south shore would convey the impression that the currents were much more regular in their tidal character

but their statements appear to be based upon the currents in the shallow water inshore, which may be different from those in the open strait.

Mr. Davis has records and notes kept at Forteau Bay, and extending back to the time of his grandfather in 1835 ; which he hopes to be able to prepare for publication.

SUMMARY.

In the following summary, the general characteristics of the current in the Strait of Belle Isle are given as correctly as they can be deduced from its behaviour during the time the observations were made. The velocities given were measured at the standard depth of 18 feet.

1. The current is fundamentally tidal in its nature ; and under normal conditions, it runs east and west with velocities which are nearly equal. It attains at times a velocity of two knots per hour in each direction.

2. The conditions are normal in moderate weather, and during the prevalence of moderate westerly winds.

3. During heavy winds, especially when easterly or westerly in direction, the current which runs with the wind becomes stronger than the current against it ; and eventually, the current may come to be continuous in the same direction as the wind.

4. The greatest velocities of the current which were observed during heavy winds (in the months of July and September) were as follows : from the east 3·15 knots ; and from the west 2·50 knots per hour.

5. The presence of ice in the strait, and the temperature of the water, have also a relation to the predominant direction of the current ; but they do not afford a reliable indication of its actual direction at the time.

6. Under normal conditions, and when both surface current and under-current in the two directions are taken into account, the difference on the average is in favour of a greater inward flow from the east.

7. The actual flow throughout the year, when the influence of the wind is included, appears also on the whole to be greater in the inward direction from the east, than outward from the west.

CURRENT in the narrow part of the gulf immediately west of the Strait of Belle Isle. Note from observations taken at stations E, F, and G.

On one occasion after prolonged and heavy westerly winds, the surface current here ran from the westward (magnetic) at the centre and on both sides. The velocity amounted to 0·79 knots per hour at the centre, and 1·19 to 1·37 knots at the sides. This in the circumstances is likely to be as great a velocity from the westward as ever occurs.

CURRENT ON THE WEST COAST OF NEWFOUNDLAND.

In going and returning to Belle Isle some measurements of this current were obtained by comparing the distance run as shown by the patent log, and the actual distance measured on the chart, according to the method already described.

The two best determinations were as follows :—

Aug. 11. Rich Point to Bonne Bay. Current 0·37 knot per hour from W. S. W. (mag).

Sept. 25 and 26, Rich Point to Cape St. George. Current 0·67 knot per hour from W. S. W. (mag.)

On Sept. 4, however, the current between Bonne Bay and Rich Point appeared to have a slight set in the contrary direction ; but the weather was then rough and the observation complicated with lee-way.

Lieut. Betty, navigating lieutenant of H. M. S. "Pelican" who has spent more than one season in cruising here, states that there is an almost constant current from the S.W. along the coast of Newfoundland between Cape Gregory and Rich Point ; which is only intercepted by the ebb and flood tides running in and out of the larger bays on the coast.

CABOT STRAIT,

or the south-eastern entrance to the Gulf of St. Lawrence between Cape Breton and Newfoundland.

This entrance to the gulf forms a portion of the deep channel or gully which runs in from the Atlantic between the St. Pierre Bank on the Newfoundland side and Banquereau and Misaine Bank on the Nova Scotia side, and thence traverses the entire width of the gulf, passes between Gaspé and Anticosti and into the mouth of the Lower St. Lawrence. This channel from the Atlantic inwards, has a width of 40 miles between the Banks on each side, and a continuous depth of over 200 fathoms. In passing through Cabot Strait, it is not contracted in width or diminished in depth except by the occurrence of St. Paul Island which lies near the western side of the deep water. This island rises abruptly from the bottom, and if left dry would probably present the appearance of one of the "Sugar-loaf" mountains of the adjacent coast. Allowing for the encroachment of this island on the western side of the channel, there is still left between it and Cape Ray a width of 32 miles in which the depth exceeds 200 fathoms; and for the greater part of this width it averages 250 fathoms.

The width of the strait lies east and west (magnetic) and the channel above described runs through it from south to north (magnetic), which makes the magnetic directions the most convenient for reference. The magnetic variation is 28° W. The currents were examined in August, between the 13th and the 31st with the interruption of the trip to North Sydney for supplies; and although the time was so short, much work was done by taking advantage of the calm weather for current measurement, and the rough days for temperature work. The record of the current was also taken continuously day and night. The stations at which the steamer was anchored, were kept to the north and south of the straight line joining Cape North and Cape Ray, to avoid the telephone and telegraph cables which lie along that line. The positions of the stations are shown on the accompanying map. The two principal stations were chosen near to the two sides of the deep channel; one of them (Station L) in 220 fathoms at 10 miles N. E. of St. Paul Island, and the other (Station M) in 230 fathoms at 13 miles W. of Cape Ray. They are thus symmetrical in position with respect to the deep channel itself; and each station was occupied twice to check any variation in the conditions.

The current, speaking generally, was found to run out of the gulf from the northward (magnetic) at Station L on the West side, and into the gulf from the south-east (magnetic) at Station M on the east side. On this account a third station P was selected where still water might be expected between these two currents; and a favourable opportunity found to ascertain whether the deep water at the bottom of the strait was in motion. The steamer was anchored at this station at the centre of the strait in 250 fathoms. The surface current was there found to be very variable in direction and at times very weak. On August 29, at a time when the surface current was almost inappreciable, the deep fan, weighted with an ordinary deep-sea lead, was lowered to a depth of 200 fathoms. This fan presented a surface of four square feet to the water, which was sufficient to indicate the slightest current, by the inclination of the line to which it was attached. This line showed an inclination of about 15° from the vertical as far down as 30 fathoms; between 30 and 50 fathoms it came within 5° of the vertical; and from 50 to 200 fathoms it remained perfectly plumb. The same indications were given again in raising it. Also on the following day, at a time when the surface current had a velocity of a little less than one knot an hour, the deep fan showed in a similar way that there was no motion below 20 fathoms. The layer of water in motion had thus a thickness of only about 20 to 40 fathoms from the surface, and below this the water was perfectly still. The relation of this thickness to the temperature at different depths will be referred to further on. This also shows that there is no constant bottom current of any appreciable velocity.

Station L, on the west side was occupied from August 13th to 15th. There was some trouble from dragging of the anchor at first; but a continuous record of the current for 32 hours was obtained. The velocity of the surface current measured at the standard depth of 18 feet, varied from 0.74 to 1.56 knots per hour, and the direction veered

gradually from N. W. to N. E. and back again to N. W. The regularity of this change in direction makes it probable that it is tidal in its nature; but the observations were not continued long enough to establish any definite relation between the two. On August 31st the station was again occupied for a few hours, and the direction and velocity were found in correspondence with the previous observations. The average direction is thus as nearly as possible from the north (magnetic) with an average velocity of very little more than one knot per hour.

While the current ran from the N. E. the undercurrent was stronger than the surface current as far down as 50 fathoms. Two measurements at 30 and 40 fathoms (made August 14th and 31st) showed the velocity at that depth to be 38 to 40 per cent stronger than at the surface.

On the other hand, while the current ran from directions west of north, two measurements of the undercurrent at 40 fathoms (made August 15th) showed the velocity to be only 50 per cent of the surface current, and its direction to be 20° more westerly.

The total thickness of the current at this station was not ascertained. This thickness might have been ascertained here and at the other stations much more definitely, if the meter which was intended for the purpose, had not failed to work electrically.

Station M, on the east side of the strait was occupied on August 22nd and again from August 27th to 29th when a continuous record of the current for 41 hours was obtained. The velocity of the surface current varied from 0.50 to 1.40 knots per hour; and the direction veered from E. to S. (mag.) the dominant direction being from the S. E. The change in direction was much less regular than at station L, and no relation can be seen between the variations in direction and velocity and the tides as recorded by the gauge on St. Paul Island.

On August 27th, at a time when the surface current had an average velocity and its usual direction from the S. E., the indication of the deep fan showed that the undercurrent extended to a depth of 50 fathoms and possibly to 100 fathoms; and that it ran from S. by E., or from a direction about 30° more southerly than the surface current. The velocity of the undercurrent at 30 and 40 fathoms ranged from 44 per cent of the surface velocity, to an equality with it; but was never greater.

On the western side of the strait, between Cape North and St. Paul Island, one station was selected at N, in 60 fathoms on the edge of the shallow water extending from Cape North. This station was occupied from August 23rd to 25th; and the current was found to run from the N. W. During the period of 48 hours immediately previous to the occupation of this station on the 23rd, the wind had ranged from N. to N. W., with an average velocity of 24 miles per hour, making a total of 1,122 miles of wind in that time. It is therefore probable that the velocity of the current as then found, was as great as it ever is. A continuous record of the current for 46 hours was obtained; and the velocity ranged from 1.39 to 2.25 knots per hour, the average being nearly 1.80 knots. In direction, the extreme variation was from N. to N. W. (mag.) the dominant direction being nearly from the N. W. There is no relation discernable between the variation in direction and the tide; but the greater velocity of the current seems to occur during the fall of the tide.

The undercurrent at 40 fathoms has only about one-third the strength of the surface current; but it appears probable that the water was in motion throughout the whole depth of 60 fathoms.

Temperatures.—The water was found to be a little warmer between Cape North and St. Paul Island than across the main opening of the Strait between that island and Cape Ray. The surface temperature there ranged from 55° to 60°; and from the surface, the temperature fell gradually with the depth till it reached 32° at about 50 fathoms. At greater depths, from 100 to 200 fathoms, the temperature was again higher and averaged about 40°. This result appeared so anomalous that the matter was carefully investigated, and every precaution taken to insure accuracy.

The temperatures, so long as they fell regularly with the depth, were taken with registering thermometers of the Miller-Casella pattern. But where there are layers of

unequal temperature, such a thermometer will only register the temperature of the coldest layer, irrespective of its depth. For this reason, the temperatures below 50 fathoms were taken with Negretti and Zambra's deep-sea reversing thermometer, which gives the actual temperature at the depth to which it is lowered. This thermometer has to be used with some care, as in very rough weather the release, which is mechanical, is apt to take place prematurely. Also, if there is much current, the steamer should be free and not anchored, as there is then so much stray line that great depths cannot be correctly measured. It is thus necessary to use time in good weather, specially for this purpose. In the present instance, two thermometers were used, which were kept in perfect working order. The thermometers were checked against each other by duplicate readings at the same depth, and were also compared directly with a standard thermometer. Any readings which there was reason to suspect of inaccuracy are omitted from the results given. In the temperature sections, the columns represent points at equal intervals apart, across the width of the strait. The temperatures are Fahrenheit.

CAPE NORTH TO ST. PAUL ISLAND.

Temperature Section, August 17th, 1894.

Surface.....	65	65	58	58
10 Fathoms.....	64	60	40	43
20 do.....	41	41	36	36
30 do.....	35	35	35	35
40 do.....	33	33	32	34
Total depth..	83 F.	90 F.	120 F.	140 F.

Same section as above, repeated September 27th. Current from N. W., (the usual direction).

Surface...	51	52	52	50
5 Fathoms.....	49	47	47	45
10 do.....	49	47	42	41
15 do.....	49	45	38	35
20 do.....	49	45	36	35
30 do.....	38	38	35	35
40 do.....	34	35	34	34

ST. PAUL ISLAND TO CAPE RAY.

Temperature section, August 16th, 1894.

Surface.....	59	60	60	59	59	55
10 Fathoms.....	42	40	44	44	41	46
20 do.....	34	38	37	38	36	37
30 do.....	32	36	35	34	33	35
40 do.....	31	33	33	33	33	34
50 do.....	31	—	33	—	—	—
100 do.....	37½	—	38½	40	—	—
150 do.....	40½	—	40½	—	40½	—
200 do.....	39½	—	—	—	—	—

On account of the rapid fall of temperature from the surface to 30 fathoms, the following additional temperatures were taken, at the points mentioned.

	Off Cape North Aug. 17.	Station L. Aug. 13.	At centre of Strait Aug. 16.	Station P. Aug. 20.
Surface.....	65	59	60	63
5 Fathoms.....	64	56	54	57
8 do.....	—	43	—	—
10 do.....	64	40	44	39
12 do.....	—	37	—	—
15 do.....	60	34	38	36
20 do.....	41	34	37	34
30 do.....	35	33	35	32
40 do.....	33	32	33	32

Deep Temperatures from 50 to 200 fathoms, between St. Paul Island and Cape Ray. Taken with deep-sea reversing thermometers, left down for 5 to 15 minutes.

I. Temperatures on August 16th as already given.

II. At Station M, August 22nd; surface current running 1·25 knots from the S.E.

III. At Station M, August 28th; surface current running one knot from the S.S.E.

IV. At Station P, at centre of Strait, August 30th. Surface current less than one knot per hour; thermometers left down for 10 to 12 minutes.

V. On a line running North (mag.) along the centre of the Strait. Temperatures at three points seven miles apart, September 27th.

Depth.	50 Fathoms.	100 Fathoms.	150 Fathoms.	200 Fathoms.
I.....	—	40	40½	—
II.....	—	38½	40½	39½
III.....	—	37½	40½	—
IV.....	—	39	—	40
V.....	32½	40	40½	39½
	35	41	40	39½
	32½	37	38	40
	32½	—	40½	39½
	32½	39	40½	39½
Mean.....	33·0	39·0	40·1	39·6

For comparison with this strait where warmer water occurs near the bottom, the temperatures were taken in the deep water in Bonne Bay. This bay is cut off from the sea by a line of comparatively shallow water not exceeding 30 fathoms; and the East Arm is again separated from the rest of the bay by a bar on which there is only 7 fathoms, while the depth in the Arm itself exceeds 100 fathoms. This deep water in so isolated a situation would naturally take the order of density according to depth. The temperatures down to 100 fathoms were as follows:—

Surface.....	54	40 Faths.....	32
10 Faths.....	48	50 do.....	32
20 do.....	39	80 do.....	31
30 do.....	34	100 do.....	30½

The decrease is thus regular, and in conformity with the density of sea-water which unlike fresh water, increases continuously in density as the temperature falls.

SUMMARY FOR CABOT STRAIT.

We thus find in Cabot Strait a current running out of the gulf on the western side, and into the gulf on the eastern side ; while in the middle the current is weak and uncertain in direction. The temperature of the water is practically the same in both cases, except within eight miles of Cape North, where it is appreciably warmer. The depth of water in motion appears to be greater on the western side, while on the eastern side the width of the flow is greater and the under-current weaker in proportion. From a comparison of the under-current with the temperatures at various depths, it is to be inferred that the movement of the water does not extend to a greater depth than perhaps 60 or 80 fathoms at the most ; and below that depth the water appears to be perfectly quiescent. The volume of water leaving the gulf on one side is thus balanced by the volume entering on the other ; and as the temperatures are nearly the same, the loss or gain of heat to the gulf is much less marked than it would be if the balance of volume lay between a surface and a bottom current. The actual balance however, is on the side of loss of heat ; as it is the outflowing water near the western side which has the highest temperature.

As to causes, it is not possible to speak very definitively from observations so limited in time and extent. It is more than likely that the layer of very cold water between 20 and 50 fathoms is the result of the chilling of the water during the winter ; and that the warmer water at the surface is due to rise in temperature with the progress of the season. But the reason that the coldest water does not sink to the bottom is by no means clear. If fresh water were in question, the temperature of 39° or 40° would then correspond with maximum density ; but the density of sea water increases uniformly as the temperature falls. The increase however is exceedingly slight for the range from 41° to 32° which we have here to deal with ; and this allows a possible explanation to be suggested. It would require the admixture of less than 1½ per cent of fresh water with sea water at 32° to give it the same density as unmixed sea water at 41°. The cold water might thus be prevented from sinking if it were chilled by fresh water ice from the river, which is not unlikely in the circumstances. The bottom water may enter direct from the unmixed water of the Atlantic ; as a depth of over 200 fathoms extends uninterruptedly from this strait to the ocean.

It is clear in any case that there is no cold under-current running out along the bottom of the strait, as might be expected in accordance with the theory of continuous inflow of cold water at the Strait of Belle Isle.

The water in the greater part of this strait is as clear as average sea water, the colour having a slightly milky tinge. From St. Paul Island westward, however, a brownish tinge appears, which becomes more pronounced towards Cape North, where the water is nearly as brown as in the Ottawa river. The colour at station N. was sufficient to stain the gauze netting of the attached float used to show the direction of the current. This suggested the possibility that the presence of St. Lawrence water might here be detected ; but the difference in density was too slight to be indicated by the hydrometers used. A number of bottled samples have been taken from the surface and from the cold layer at 40 fathoms, in order to determine the density with greater accuracy.

The determinations of the density were made at the laboratory of the Inland Revenue Department, with the following results, reduced to 60° Fahrenheit :—

Cape Ray to St. Paul Island.

Average of surface water, from a mixture of a number of		
samples (27 Aug., '94).....		1.0242
At Station P. at centre of Strait, surface water (30 Aug., '94)		1.0241
do	do	at 40 fathoms (30 Aug., '94) 1.0253

St. Paul Island to Cape North.

Average of surface water (17 Aug., '94).....	1-0227
At Station N, 8 miles off Cape North :—Surface water, (23	
Aug., '94).....	1-0218
Surface water (25 Aug., '94).....	1-0221
At 40 fathoms (25 Aug., '94).....	1-0249

The lesser density of the surface water between St. Paul Island and Cape North is evident; while at 40 fathoms its density is nearly equal to the average in the wider part of the Strait, where the density of 1-0242 is the average for both the outgoing and incoming water. In comparison with this, the mean density of 1-0220 at Station N., between Cape North and St. Paul Island, would indicate an admixture of 9 per cent. of fresh water. Although this result is based upon a few observations it affords an indication of importance, as it points to the presence of river water, and therefore a possible connection between the Gaspé current and the current flowing outwards at Cape North; and thus furnishes a clue which should be followed up and further investigated.

GENERAL REMARKS.

One of the aims in this season's work, was to ascertain the nature of the currents in the two entrances to the Gulf of St. Lawrence as a basis for the examination of the currents throughout its area. From this point of view a few general remarks may now be made.

In the Strait of Belle Isle, while the current maintains its tidal character, there is only a difference in favour of inward flow from the east; and during the summer months the actual balance of flow does not probably give more than a moderate percentage in favour of the inward direction. The influence therefore on the Gulf as a whole cannot be very great. During times however when the current runs predominantly in one direction for several days, with a velocity which may attain a maximum of three knots, the effect upon the gulf must be more marked, and the distance to which its influence extends may be considerable.

A predominant current running inwards through the strait in the early spring, may not have a very marked influence so far as temperature is concerned; because at that season the water in the north-eastern end of the gulf must be nearly as cold as the water entering through the strait. This incoming volume of water may help however to account for the increased velocity which the outward current on the west side of Cabot Strait is reported to have in the spring. Even if the water itself does not reach Cabot Strait, it may still act by displacement, as the total volume of the gulf must remain nearly the same. This is much more probable than the explanation often made that this increased velocity is due to the spring floods in the tributaries of the St. Lawrence River. The influence of the St. Lawrence upon the currents in the gulf is usually much exaggerated. It may therefore be well to mention that a current of only half a knot per hour through the Strait of Belle Isle, would admit a volume of water 40 times greater than the discharge of the St. Lawrence as measured between Montreal and Lake St. Peter.

The two main currents at the two sides of Cabot Strait are the most important with reference to the interior of the gulf. It is possible that the current on the western side may have some relation to the current running outward along the Gaspé coast, and the reported direction of the current near the Magdalen Islands seems to make this the less improbable. The current along the west coast of Newfoundland might possibly prove to be a continuation of the inward current on the eastern side of Cabot Strait. Further to the north-east, in the narrower part of the gulf towards the Strait of Belle Isle, the current was also found on one occasion to be running from the westward at both sides simultaneously; but the circumstances appear then to have been exceptional, as already pointed out.

These suggestions are made to show that the currents in Cabot Strait require to be further traced ; and this should be done both within and without the strait ; and the facts already ascertained will be helpful as a basis in doing so. It may also prove of importance to follow the progressive change of temperature in these currents from the early spring throughout the summer ; as this should give light as to the nature of these currents, and would also help in tracing their direction and influence.

There is thus an ample choice in deciding upon the best direction in which to carry forward the survey of the currents from the basis already obtained. It will also be possible to speak with greater certainty regarding these currents, when they have been more extensively followed and investigated.

I have, sir, the honour to remain,

Your obedient servant,

W. BELL DAWSON,
Engineer in charge of Tidal-Survey.

APPENDIX No. 4.

METEOROLOGICAL OFFICE,

TORONTO, 25th September, 1894.

WM. SMITH, Esq.,
Deputy Minister of Marine and Fisheries,
Ottawa, Ont.

SIR,—In compliance with the request contained in your letter of the 20th instant I have the honour to inclose herewith the Annual Report of the Meteorological Service and Magnetic Observatory for the fiscal year ended 30th June last.

I have the honour to be, sir,
Your obedient servant,

R. F. STUPART,
Acting Director.

METEOROLOGICAL SERVICE.

WILLIAM SMITH, Esq.,
Deputy Minister of Marine and Fisheries,
Ottawa, Ont.

SIR,—I have the honour to submit herewith the twenty-third report of the Meteorological Service, this report being for the period July 1st, 1893, to June 30th, 1894, with appendices A, B, and C, inspectors' reports and reports on Quebec and St. John Observatories.

During the year the following stations were added to the number reporting :—

ONTARIO.

Class I.—

Stratford (from Class II.) W. Dick.

Class II.—

Thorold Z. W. Durkee.
Haileybury P. A. Cobbold.
Virgil W. H. Harrison.
Courtright C. M. Sinclair.
Trenton Rev. F. W. Armstrong.

Class III.—

Merritton T. J. Stevensen.
Sutton West W. D. Townley.
Waterford Sylvanus Phillips.

MANITOBA.

Class I.—

Stony Mountain A. G. Irvine.

Class II.—

Pipestone A. G. Rattray.

NORTH-WEST TERRITORIES.

Class II.—

Pincher Creek.....	G. W. Gill.
Alameda.....	R. L. Gibson.
Pheasant Forks.....	L. Franks.
Moose Jaw.....	C. A. W. Stunt.

Class III.—

Pense.....	B. Spring Rice.
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BRITISH COLUMBIA.

Class II.—

Enderby.....	G. R. Lawes.
Pilot Bay.....	J. D. Marsden.
Rivers Inlet.....	G. S. McTavish.
Stuarts Lake.....	A. C. Murray.
Alberni.....	A. E. Reeve.
Canoboie.....	Lieut. Col. G. H. Elliott.
New Westminster.....	Joseph H. Edwards.
Kaslo.....	J. W. Cockle.
Keeper Island.....	Rev. R. J. Roberts.

Class III.—

Union Mines.....	R. Lawrence, M.D.
Duncan's Station.....	Mallcott Richardson.
Langley.....	A. H. Hawkins.
Beaver Creek.....	Stanley R. S. Bayne.
Gold Stream.....	William H. Ralph.

During the year the following stations ceased to observe :—

British Columbia.

Class II.—

Vernon.—Death of observer.

Ontario.

Class I.—

Alexandria.—J. Smith, M.A., removed from station.

Class II.—

Niagara Falls.—E. Norden, resigned.

Egremont.—J. G. McCullough, deceased.

In December last Mr. W. A. Ashe, the director of the Quebec Observatory, died after but a brief illness; the position has since been filled by the appointment of Mr. Arthur Smith, P. L. S.

Mr. J. McLean, who for many years performed the duties of observer at Owen Sound satisfactorily, was forced by increasing age to resign the work, but he obtained the service of Mr. D. McKenzie, who continues the duties at that station.

Mr. Mellor, of Birnan, who resigned and left the station from ill health, has returned to that place and resumed observing.

Of the two clergymen mentioned in the preceding report as stationed in the Mackenzie River District, Mr. Stringer continues to report from Fort McPherson; Mr. Marsh has forwarded observations from Fort Liard, but has been moved to Hay River in the same district and continues to observe there.

In the case of the observations made by officials of the Canadian Pacific Railway considerable interest has been shown in the work by the divisional superintendents and I anticipate increased regularity in the work from that and from the recent visits of the inspectors of this service.

The observers in Ontario and Manitoba under the Department of Agriculture have continued to discharge their duties with commendable zeal. The Minister of Agriculture of Manitoba has expressed a desire to aid this office in obtaining stations in parts of the province in which stations are not located.

The large increase in the number of observing stations in British Columbia, necessitated by the individual peculiarities of different localities, is mainly due to the careful and zealous cooperation of the Minister of Agriculture and of Mr. J. R. Anderson, of that department.

STORM SIGNAL SERVICE.

During the past year the storm warnings have been most satisfactory. During August and the autumn months several particularly severe storms passed over both the Lake Region and Maritime Provinces; notable among these were, a West India hurricane, which swept over Nova Scotia during the night of August 21st, causing much loss of shipping and destruction of property generally; another West India hurricane, which entered the United States in South Carolina, moved north to New York State and thence down the St. Lawrence Valley, giving a fresh gale on Lake Ontario, the St. Lawrence and the Maritime Provinces; and a third West India hurricane, which entered America on October 13th, moved rapidly to the Lake Region, there causing a disastrous gale, and thence down the St. Lawrence Valley causing a storm of lesser violence in the Gulf and Maritime Provinces. All these storms were well warned, and doubtless much property and many lives were thereby saved.

There has been a marked improvement as regards the time taken in the telegraphic transmission of storm warnings, the telegraph companies having obviously used their best endeavours to facilitate our work.

The following table shows the total number of storm warnings issued and the percentage verified:—

Year.	Total number.	Number verified.	Percentage.
1877.....	743	510	68.6
1878.....	860	673	78.3
1879.....	712	591	83.0
1880.....	889	736	82.8
1881.....	854	727	85.1
1882.....	841	658	78.2
1883.....	1,085	858	79.1
1884.....	798	663	83.2
1885.....	810	741	89.3
1886.....	906	799	88.2
1887.....	1,093	972	88.9
1888.....	897	758	84.5
1889.....	1,126	926	81.3
1890.....	1,199	987	82.3
1891.....	1,017	826	81.2
1892.....	1,161	888	80.7
1893.....	1,317	1,118	84.9
1894, six months, 1st January to 30th June....	245	223	91.0

WEATHER FORECASTS.

Weather forecasts have been issued regularly throughout the period comprised in this report, they have been published daily by most of the leading newspapers of the Dominion besides being posted at about 1,500 telegraph offices in Manitoba, Ontario, Quebec, and the Maritime Provinces.

The demand from persons in Toronto and at a distance for special forecasts continues to increase and in all cases predictions have been furnished at once to those asking for them.

Warnings of approaching storms, as heretofore, were issued to the railways and have apparently been much valued.

Train signals as usual were displayed during the summer on the morning trains in the older provinces.

The percentage of verification of the forecasts for the year has been well up to that of the past few years, although the abnormal and erratic movements of storm centres during the latter part of May and early June caused many failures in the predictions issued during that period.

The following table (No. 2) shews the predictions and the percentage of fulfilment in each district, in each month, and in the whole period :—

NUMBER of Predictions and percentage of fulfilment in each

MONTH.	MANITOBA.					LOWER LAKE REGION.					UPPER ST. LAWRENCE.				
	Number of predictions.	Verified.				Number of predictions.	Verified.				Number of predictions.	Verified.			
		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.
1893.															
July	91	69	13	9	83.0	114	92	17	5	88.2	95	74	14	7	85.3
August	94	71	13	10	82.4	120	85	16	19	77.5	105	82	15	8	85.2
September	87	63	15	9	81.0	109	81	17	11	82.1	95	70	13	12	80.5
October	93	71	12	10	82.8	119	87	14	18	79.0	107	78	14	15	79.4
November	101	73	12	16	78.2	121	93	15	13	83.1	112	88	15	9	85.3
December	101	63	23	15	73.8	119	87	16	16	79.8	115	87	21	7	84.8
1894.															
January	89	78	8	3	94.4	100	70	22	8	81.0	100	70	22	8	81.0
February	88	69	7	12	82.4	103	83	10	10	85.4	92	72	8	12	82.6
March	90	57	15	18	71.7	105	75	19	11	80.5	98	68	14	14	78.1
April	91	75	11	5	88.5	98	80	13	5	88.3	90	77	7	6	89.4
May	88	62	14	12	78.4	98	72	13	13	80.1	88	67	11	10	82.4
June	84	66	8	10	83.3	104	82	13	9	85.1	85	58	10	17	74.1
Total	1,097	817	151	129	81.4	1,310	987	185	128	82.4	1,180	891	164	125	82.5

NOTE. --The percentage of verification is obtained by taking the sum of those fully verified and half

District in each Month, and in the Year, July, 1893, to June, 1894.

LOWER ST. LAWRENCE.					GULF.					MARITIME.					TOTAL.				
Number of predictions.	Verified.				Number of predictions.	Verified.				Number of predictions.	Verified.				Number of predictions.	Verified.			
	Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.
97	73	13	11	82.0	100	80	8	12	84.0	102	81	13	8	85.8	509	469	78	52	84.8
100	73	14	13	80.0	97	77	4	16	81.4	100	74	17	9	82.5	616	462	79	75	81.4
93	66	15	12	79.0	97	72	12	13	80.4	95	58	23	14	73.2	576	410	95	71	79.4
108	85	14	9	85.2	109	85	16	8	85.3	105	79	18	8	83.8	641	485	88	68	82.5
102	75	14	13	80.4	94	69	13	12	80.3	100	70	20	10	80.0	630	468	89	73	81.3
111	89	11	11	85.1	106	85	12	9	85.8	113	79	20	14	78.8	665	490	103	72	81.4
102	80	12	10	84.3	101	74	12	15	79.2	101	70	16	15	77.2	503	442	92	59	82.3
86	67	10	9	83.7	86	73	7	6	89.0	90	64	15	11	79.4	545	428	57	60	83.8
95	73	13	9	83.7	91	71	10	10	83.5	101	67	21	13	76.7	578	411	92	75	79.1
88	76	7	5	90.3	83	72	5	6	89.8	96	66	27	3	82.8	546	446	70	30	88.1
91	76	12	3	90.1	92	64	16	12	78.3	83	56	18	9	78.3	540	397	84	59	81.3
85	63	11	11	80.6	86	57	19	10	77.3	95	72	11	12	81.6	539	398	72	69	80.5
1,158	896	146	116	83.7	1,142	879	134	129	82.8	1,181	836	219	126	80.1	7,068	5,366	969	703	82.1

the sum of those partly verified and dividing by the whole number.

CENTRAL OFFICE.

Since August, 1893, Mr. Charles Ross has been employed as telegraph operator in place of Mr. R. Cummings resigned, and in June last Mr. F. N. Derivision was appointed to fill the vacancy caused by the resignation of Mr. F. G. Drewitt. These are the only changes that have occurred in the staff of the office.

The unavoidable absence of the director owing to illness, and the supplying of meteorological data to the Tidal Survey has entailed a considerable amount of extra work which has however been cheerfully performed by the various members of the staff.

The fire proof vault in which to store the many years valuable meteorological and magnetical records of the service was built in May last. All important books and papers have been placed in it, thus assuring them from loss in case of fire.

TIME SERVICE.

The method of performing this work, together with a table showing the discordance at the different observatories, will be found in the report on the Magnetic Observatory.

The report on Quebec Observatory forms Appendix B.

The report on St. John Observatory forms Appendix C.

VOLUNTARY OBSERVERS.

To the many volunteer observers reporting to the central office, the country is indebted for a great part of the data necessary for a study of its varied climate, and the thanks of the department and of this service are due these men who year after year go on observing and in return for the valuable information they supply receive little beyond the bare acknowledgement of their abstracts.

PUBLICATIONS.

Applications are frequently made by persons and institutions in different parts of the world for the publications of this office. Nearly 710 annual reports and over 800 copies of the monthly Weather Review are distributed immediately upon their being printed.

LIBRARY.

The number of publications received during the year was 270, being for the most part annual reports, pamphlets, and periodicals, from the principal astronomical, meteorological and magnetical institutions of the world.

INSPECTION OF STATIONS.

There were 67 stations inspected during the period covered by this report. Of these 4 were inspected by Mr. Stupart, 30 by Mr. Payne and 33 by Mr. Webber.

These reports form Appendix A, and give the state and condition of the various places visited, and shew the absolute necessity of regular and systematic inspection.

All of which is respectfully submitted.

R. F. STUPART, *Acting Director.*

INSPECTORS' REPORTS.

INSPECTOR R. F. STUPART.

Stratford, Ont., 22nd November, 1893.—Mr. William Dick, the observer at this place is enthusiastic in his work, he furnishes a daily weather report to the local paper and also a monthly summary. He has a barometer and a full set of thermometers, all of which are carefully read and looked after.

Sarnia, Ont., 24th November, 1893.—Everything at this place is in good order. Mr. McAdams attends to his work well.

Courtright, Ont., 24th and 25th November, 1893.—Mr. C. M. Sinclair who has volunteered to take observations at Courtright, resides within one hundred and fifty yards of St. Clair River. I left with him a barometer, a full set of thermometers, and a rain-gauge, and all necessary tables and instructions. Mr. Sinclair appeared to understand the work and it is quite likely that this may prove a very useful station.

London, Ont., 27th November, 1893.—Everything all right here, except that both maximum and minimum thermometers were hung too much on the slant.

INSPECTOR H. V. PAYNE.

Port Arthur, Ont., 20th July, 1893.—Electrical windmill vane nearly worn out, new one will be required. Minimum thermometer was reading 2° too low. Storm signals and mast in good repair. Other instruments in good order.

Fort William, Ont., 21st July, 1893.—The storm signal mast and shed which had been erected by the town were not first class. The mast although of good size was not straight and the signal shed a rough affair. Instructed agent in duties. To insure quick delivery of warnings and economy, it would be advisable to run a telephone to his house, in connection with the agent at Port Arthur.

Winnipeg, Man., 24th July, 1893.—Tested all the instruments and found them in good order. Pointed out errors in rainfall observations and omissions of observations which generally occurred in the morning.

Qu'Appelle, N.W.T., 27th July, 1893.—Anemometer not working properly, down shafts loose and gearing much worn. Wind vane dial rusted and not working. These were put in order. Rain-gauge required two new receivers. Errors in entering rainfall pointed out. Barometer and thermometers were tested and showed satisfactory results.

Swift Current, N.W.T., 28th July, 1893.—Barometer cistern so dirty it was impossible to set correctly. This was put in good order. I found an error in barometric correction table for reduction to sea level. Anemometer and anemograph in good order, but the tower required more rigid supports. Pointed out omissions in sending morning telegraphic reports. Barometer and thermometers tested and reading correctly.

Medicine Hat, N.W.T., 29th July, 1893.—There are two barometers here which, on comparing with a standard, read correctly. This will not account for the continued discrepancy in barometric readings from this station, and it can only be assumed that the Canadian Pacific Railway level used in reducing the observations is wrong. Other instruments were in good order but their position is not as good as it should be. Delay in sending returns was owing to illness of observer.

Calgary, N.W.T., 31st July, 1893.—The barometer cistern was leaking but the barometer was still reading correctly; the mercury also required cleaning. Put in a new cistern and cleaned the mercury. All thermometers tested—two minimum thermometers were found out of order and were properly adjusted. There are no wind gauges here, but I think it would be advisable to supply this station with them, although the exposure is not very good.

Glacier, B.C., 2nd August, 1893.—Thermometers and rain-gauge in good order, measuring glass broken. Temperature observations seem too uniform to be correct.

Vernon, B.C., 4th August, 1893.—Instruments well placed and on testing found to be all in good order. Observations are well taken here and the observer will add report of crops, &c., to other observations.

Mission Valley, B.C., 7th August, 1893.—Thermometers in good order excepting one minimum broken. Observer takes much interest in the work and would, if another minimum were supplied, take another set of observations on the bench lands up the mountain. It is found that many fruits, vegetables, &c., will grow higher up the hills which will not nature in the valley. Position of thermometers changed.

Mable Lake, B.C., 7th August, 1893.—Instruments for this station were still at Vernon, observer will start observing in October.

Spence's Bridge, B.C., 9th August, 1893.—The barometer required cleaning and is now all right. Thermometers were tested and left in good order. Records are well kept.

Vancouver, B.C., 12th August, 1893.—The observer has left the town, I could not find any trace of the rain-gauge he had.

Hazlemere, B.C., 16th August, 1893.—This station is in a new and developing good agricultural district near the west end of the international boundary. Observer takes much interest in the work. Thermometer shed required to be properly placed. Rain-gauge was moved to better exposure. Wind record useless, as station is surrounded by high trees. Thermometer tested and found in good order—returns well kept.

Abbotsford, B.C., 18th August, 1893.—Is seven miles from Mission City, and in view of observer not taking observations at Mission City, will be a serviceable station. Returns are well kept. Thermometers and rain-gauge in good order. Rain-gauge moved to a better exposure. Observer will make extra notes of crops, &c.

Mission City, B.C., 19th August, 1893.—The observer declined to continue observations excepting rain-fall. Instruments, excepting rain-gauge, were therefore taken away and distributed at other places.

Agassiz, B.C. 21st August, 1893.—Experimental farm. One ordinary thermometer found broken; other thermometers were in good order. Rain-gauge and sunshine recorder properly exposed. Returns well kept.

Loch Erroch, B.C., 22nd August, 1893.—Mercury in maximum thermometer will not unite, making reading continually 1° too high. This will be allowed for. Other instruments are in good order. Records well kept.

Kamloops, B.C., 24th August, 1893.—All instruments in good order. Rain-gauge required levelling. Observer has little time to take observations, but will try to continue them.

Donald, B.C., 26th August, 1893.—Thermometers and rain-gauge all in good order, and observations well taken. Observer declines to take rainfall observations.

Glenbow Ranch, N.W.T., 29th August, 1893.—Thermometers and rain-gauge all in good order, but an inner and outer thermometer shed is required. Rain-gauge well exposed. Observer would take barometric observations if barometer were supplied. Records well kept.

Fort McLeod, N.W.T., 31st August, 1893.—The observer away and house shut up. Anemometer cups unshipped and thermometer shed on the ground. Met observer at Pincher Creek later; he informed me that one minimum thermometer was broken, and one ordinary thermometer stolen. He promised to resume observations shortly on his return.

Pincher Creek, N.W.T., 31st August, 1893.—Near the Crow's Nest Pass and well situated for observations, excepting for wind, for which the exposure is not good. Wind instruments are placed on a well constructed erection and are in good order. Thermometers and rain-gauge are properly exposed. Records well kept.

Virden, Man., 5th September, 1893.—No observations had been taken here for some time. Observer promised to resume observing, having just returned from England. Maximum thermometer has bleb in the column which cannot be shaken out. Observer will allow for this. Thermometers very well placed. All instruments excepting the maximum thermometer were in good order. Observer will take wind observations if anemometer is supplied him.

Brandon, Man., 6th September, 1893.—Station at experimental farm. Thermometers, sunshine recorder and rain-gauge are all well placed in position some height above low land, and, with the exception of the minimum thermometer which was broken, were all in good order.

Sourisford, Man., 8th September, 1893.—Instruments were in a disgraceful condition, thermometer shed, rain-gauge, ordinary thermometer and maximum thermometer were broken and useless. The other instruments I took away and sent to Alameda.

Cobourg, Ont., 17th October, 1893.—The arm had been wrenched off the mast which is not a good one and not strong enough to hold the signals. Temporary arrangements were made to hoist the signals until the end of the season. A new and stronger mast will be required which should be placed further on the wharf.

Trenton, Ont., 29th May, 1894.—Mast required painting and setting up straight. Signals were rotting on the wharf as owners will not allow a shed to be built as they

are no longer agents for the service. The present position is a good one but situated as it is the duties cannot be carried on satisfactorily.

Picton, Ont., 30th May, 1894.—Mast required painting and new shelter built.

Prinyer, Ont., 31st May, 1894.—New mast and shelter look well, but mast required wire stays and new halyards; signals were all in good order.

INSPECTOR B. C. WEBBER.

Warton, Ont., visited 25th July, 1893.—The rain gauge is well exposed in a large open space; it required, however, one big and two small receivers. Every reliance can be placed on returns from this station.

Owen Sound, Ont., visited 26 July, 1893.—Some trouble has been experienced in keeping one of the lamps burning, and it was necessary to have the blocks changed, as they caused the halyards to jam. Captain Simpson has not taken down the old mast on the elevator as per agreement.

Parry Sound, Ont., visited 27th July, 1893.—The telegraph line between Parry Sound and Rosseau was in a wretched condition, hence probable cause of signals often missing. I brought this matter before the proper authorities. The anemometer tower was sadly in need of paint to preserve it from utter destruction, and it ultimately received two coats. The signal mast is in good order, and the necessary repairs have been made to the drum house. The anemometer was much worn and has been replaced by a new one.

Beatrice, Ont., visited 26th August, 1893.—The observer in attempting to clean the barometer had placed the mercury in a metal receiver, result amalgamated mercury and useless barometer. Replaced it by Green 3271, and cautioned observer not to try to clean barometer another time. The minimum thermometer reads $1^{\circ}5$ too low, no detached spirit at the end of the tube.

North Bay, Ont., visited 9th October, 1893.—The readings of the thermometers proved that they had not been set for some time, they were also very dirty. The rain gauge was badly dented and much rusted. The Canadian Pacific Railway authorities who directed their agent at this place to attend to the duties, were notified of the carelessness displayed.

Mattawa, Ont., visited 10th October, 1893.—The instruments are in good order at this station, and the work is well attended to by the observer, the Canadian Pacific Railway agent.

Eau Claire, Ont., visited 11th October, 1893.—Mr. Gale, the observer at this station, lives in the township of Calvin, 21 miles west of Mattawa. The instruments are well exposed, and the observations should be of value.

Rockliffe, Ont., visited 12th October, 1893.—A large amount of mercury had leaked out of the barometer 3289, and it could only be set as high as 2,990 inches, it also contained air to the amount of .025 inches. The same barometer had leaked in a similar way before, so considered it better to replace it by No. 3280 I had with me. Mr. McIntyre says he is still assured that no one meddles with it. The minimum thermometer continues to read 1° too low, a correction for this amount will in future be applied. The thermometer shed will need re-painting in the spring.

Pembroke, Ont., visited 15th October, 1893.—Closed this office as no observations had been taken for several years.

Renfrew, Ont., visited 16th October, 1893.—The spirit in minimum thermometer No. 830 failed to keep united, so changed it for No. 69149, which I had collected from Pembroke. Much care is still given to the observations at this station.

Port Stanley, Ont., visited 7th March, 1893.—The anemograph after its eighteen years' service was returned to the central office for cleaning and repairing. The barometer correction remains as heretofore. All thermometer scales were re-marked. The derrick recently constructed to carry the anemometer is rather a flimsy affair and not painted. The anemometer was much rusted, owing to insufficient care together with the loss of top binding screw, its contact makers also required some adjustment.

Woodstock, Ont., visited 8th March, 1894.—The barometer and battery were again in a very dirty condition, the former owing to continued use of sulphur matches instead

of a lamp or candle, and the latter owing to want of attention. The anemometer through want of oil was rusted, to its socket, and its screw cap was missing. The stand for the rain gauge was broken, and the thermometer shed and fence quite worn out. The observations themselves had been most carelessly taken. As representations were made that a radical change for the better would ensue here, it was decided by the director to thoroughly re-equip this station, and on the 17th of April I revisited Woodstock and placed everything in order, the anemograph was removed to a more suitable position, and the two small old thermometers were replaced by the large ones now generally used.

Port Arthur, Ont., visited 25th May, 1894.—A careful set of comparisons proved the Adie barometer at this station to be reading—.019 inches. The barometer had been removed from the inner to the outer shop some time between 1892 and 1893, but the observer had not the date.

The proposed new site for the instruments at the government building is not suitable in any way for them. The roof is not available for an anemometer, and were it so the exposure would be no better than the one now in use, and as the grounds are not inclosed, it would be unsafe to put out the thermometers and rain gauge. The anemometer was placed on a thin scantling and rocked very much, I arranged that a good strong platform be erected to carry the instruments, and on my return trip this had been built, but it was found necessary to have it further stayed. The storm signal mast required repainting, and this was contracted for and accomplished.

Fort William, Ont., visited 25th May, 1894.—The mast is a good and high pole. The agent said it was impossible for him to hoist signals without the aid of a windlass so permission was granted him to have one erected at a small cost.

Winnipeg, Man., visited 28th May, 1894.—The authorities there were plainly told that it was imperative that no observations be missed and I was assured that we should not have to complain again in this matter. The instruments were all in very good order. On representations of the observers I interviewed the manager of the Great Northwestern Telegraph Company *re* incivility and inattention of his boys when receiving the signals by telephone. I again respectfully urge that it be made essential that the Winnipeg observer be able to telegraph. The manager of the telegraph company is willing to run a loop into the college as soon as there is any one there who understands telegraphy. Green barometer no. 2740 with case, which I found stored away and leaking, I thoroughly renovated and left in position reading correctly, as a spare instrument.

Minnedosa, Man., visited 29th May, 1894.—The barometer here was excessively dirty with a good bit of air in it; it was barely readable. It received the necessary renovation and the new mercury was used. The thermometers are now placed on top of the hill; the fence was rickety and I had it made firmer.

Portage la Prairie, Man., visited 30th May, 1894.—The instruments are well exposed at the Home for Incurables, and in good order. The warden, Mr. Young, has undertaken the duties of observer.

Elkhorn, Man., visited 31st May, 1894.—Found that barometer had been broken in transit from Virden. M. Mowat is very anxious to be furnished with another one. I instructed him how to read a barometer and also the method of obtaining the humidity. The exposure of the anemometer is of no value and the readings will not be taken.

Qu'Appelle, N. W. T., visited 2nd June, 1894.—The barometer here was cleaned the new mercury being used, it was found to be reading correctly. The catches on both the maximum and wet bulb thermometers were broken permitting the tubes to slide on the scales, these were made rigid. Mrs. Gordon was cautioned to give great care to the work of observing.

Regina, N.W.T., visited 4th June, 1894.—A new thermometer shed, complete, was needed at this station, the one in use being very dilapidated. More shafting was also supplied for the anemometer, to enable the dials to be placed more conveniently. The authorities are desirous of being furnished with a barometer. The work is seemingly carefully attended to.

Saskatoon, N. W. T., visited 6th June, 1894.—The instruments are well exposed at this station: they are in good order and the work is done with great care.

Henrietta, N. W. T., visited 7th June, 1894.—The same report applies here as at Saskatoon.

Duck Lake, N. W. T.—Inspector Strickland, North-west Mounted Police, applied for a set of instruments at this station, assuring me that the work would be attended to properly. As this is a desirable point for maximum and minimum temperatures and precipitation observations I respectfully recommend that these instruments be furnished him.

Battleford, N. W. T., visited 7th June, 1894.—Cleaned the barometer at this station using the new mercury, it was not opaque however, although not touched for three years. The connecting cog of the anemometer was reversed as it was much worn. All other instruments in very good order.

Prince Albert, N. W. T., visited 9th June, 1894.—The barometer was leaking badly owing to loosening of binding of bag and it could barely be set; it was renovated thoroughly. The townspeople here are anxious to have the observing station placed on the hill at the back of the town as they suppose a higher mean winter temperature can there be obtained. Mr. Davison, if appointed sole observer, is quite willing to move to this higher ground, and to run up the telegraph wire to lessen chances of delay in transmission of signals. The anemometer was not tightly fastened to the platform, neither was it level.

Swift Current, N.W.T., visited 15th June, 1894.—The barometer here had air in it amounting to .028, it was renovated thoroughly and new mercury substituted. The anemograph was not working; in the first place, there was no battery, and secondly, the outside connecting wires were broken. Great carelessness is evidently displayed over the work here, and Mr. Knight is apparently away from Swift Current oftener than he is there.

Medicine Hat, N.W.T., visited 16th June, 1894.—The spare barometer No. 2682 with cracked cistern, I renovated, using the requisite pieces from the broken barometer brought from Elkhorn, so there are now two good barometers at this station reading correctly. The thermometers were in good order and fairly well exposed as was also the rain-gauge.

Calgary, N.W.T., visited 18th June, 1894.—Both barometers were leaking here, the Negretti and Zambra owing to defective washers, and the Green to loosening of binding of bag. These leaks were rectified, but the barometers are both still in error, the Negretti zero point has been changed, and the ivory point of the Green broken, adjustment of the latter's scale still left it faulty. A new barometer is needed here. Mr. O'Brien has the instruments at the Loughheed Block; the roof of this building would give a good wind exposure, permission can be obtained to erect a platform thereon, this latter could be built at a nominal cost, as the tenders I procured prove, and I strongly urge that this be done, and that Mr. O'Brien be allowed the emolument given at most of the telegraph stations, in consideration of the extra work that would be entailed by the addition of an electrical anemometer.

Edmonton, N.W.T., visited 20th June, 1894.—The barometer was quite opaque and received the requisite cleaning, the new mercury being used. The anemometer, owing to the want of oiling, had become so much rusted, that it required a stiff breeze to revolve the cups, it was also not firm on the platform owing to some needed repairs to the latter. I thoroughly renovated the instrument, and had the platform made rigid. Mr. Taylor was informed that greater care must be given to the anemometer in future, and he promised that this would be done. The catch of the maximum thermometer was broken, this was attended to. Mr. Taylor reports that the wire to Calgary is often out of order, and is desirous of having a loop from the Government line run to his office.

Banff, N.W.T., visited 27th June, 1894.—I found Mr. MacLeod, the observer, laid up in the hospital, and Miss Stewart was kindly taking the observations, the instruments having been removed to Mr. Stewart's house. The barometer was leaking badly through the binding collar, and it also contained considerable air. I cleaned and reno-

vated it, using the new mercury, and feel assured that it is now reading correctly, but could not test it, as owing to the altitude of this place, the barometer was reading 25.300 inches, and the standard instrument in my possession did not read so low. Mr. MacLeod hoped to shortly resume the work, and when a permanent position for the barometer is selected, its height above sea level will be ascertained.

Donald, B.C., visited 29th June, 1894.—The thermometer shed remains in the old position. The rain-gauge had not been used, it is however now put in a good place, and the amount of the rainfall will be taken. The barometer in use is a small aneroid, it was reading about .120, I corrected it. I should judge that Mr. Blythe is a careful and conscientious observer.

Glacier, B.C., visited 30th June, 1894.—The instruments are all in good order and well placed.

Griffin, B.C., visited 30th June, 1894.—The same report applies here as at the Glacier.

Spence's Bridge, B.C., visited 30th June, 1894.—Cleaned the barometer at this station. The instruments are all in good order. Mr. Murray led me to understand that the Sunday observations would be taken in the future.

Before closing my report, I would respectfully ask you to take into your consideration the establishment of a well equipped meteorological observing station at the Glacier, B.C. The snow fall at this place is annually very great, and last winter it is reported to have been at least twelve feet more than usual. It is probable that the snow here gives a fair idea of the general fall over the Selkirk range, and the approximate amount once arrived at, taken in conjunction with early spring temperatures, should make it possible to issue a pretty accurate forecast of the amount of rise in British Columbia rivers that might be expected.

MAGNETIC OBSERVATORY.

WILLIAM SMITH, Esq.,
Deputy Minister of Marine and Fisheries,
Ottawa, Ont.

SIR,—I have the honour to submit herewith the report on this observatory for the fiscal year ended 30th June, 1894.

During the above period the six daily magnetic and meteorological eye observations taken at 6.00 and 8.00 a.m., 2.00, 4.00 and 10 p.m., and midnight, have been continued as in former years. On Sundays the hours of observations are 8.00 a.m. and 2.00 p.m. together with the 8.00 p.m. observation for the meteorological service.

The self-recording magnetographs have been kept in operation and also the barograph and thermograph. Hourly measurements of the photographic curves have been made, the results abstracted, and the daily and hourly means then struck.

Absolute determinations of the magnetic elements have been made with regularity, but it has been found necessary to make them on Sundays, as the electric currents carried by the wires of the street railway are a disturbing influence, which although not materially affecting the accuracy of the results as shown by the photographic traces is yet sufficiently noticeable to make it impossible to satisfactorily determine zero values while the cars are running.

On the Sundays in June, absolute determination of the zero values of the various magnetic instruments were also made by means of a portable magnetometer in the centre of the university lawn, distant from all local attraction, in order to test to what extent the values had been affected by the erection and equipment of the School of Practical Science. It was found that all the instruments are affected, but that things have apparently already assumed what is likely to be a tolerably permanent condition unless other buildings be erected near by. It will take much time and labour to reduce the observations of the past four years owing to the difficulty of separating true magnetic changes from changes due to other disturbing influences.

The most important magnetic storms registered at the observatory occurred August 6th and 7th, October 1st and 2nd, January 3rd and 4th, February 21st, 22nd, 23rd and

25th, March 30th, June 9th and 10th. Blue prints of the photographic traces of these disturbances have been made and forwarded to Greenwich for comparison with those obtained in other observatories.

TIME SERVICE.

During the year 10 solar transits and observations of stars in the meridian for time on 94 days were taken at the Toronto Observatory, in which 513 stars have been observed. The positions of the stars as given in the "Berliner Jahrbuch" have, as formerly, been used in the reductions.

Determinations of the collimation error of the transit instrument have been frequently made, chiefly by micrometrical measurements on the cross wires in the collimating telescope.

The exchanges of time between the observatories at Montreal, Quebec, St. John, and the Toronto Observatory have taken place as usual, the comparisons being registered on the chronograph.

The errors of the clock at Toronto and the different time pieces used by the observers being computed from the latest observations.

The clock and chronometer comparisons and transit observations for time sent in from the Quebec and St. John observatories have been examined.

The following table shows the difference between the time by "Standard Observer" and that given at the various exchanges. The sign + indicates that the time as sent from the various observatories is faster than that by the "Standard Observer."

	Toronto.	Montreal.	Quebec.	St. John.
1893.	Seconds.	Seconds.	Seconds.	Seconds.
July 18.....	+0.22	-0.22	+0.06	+0.16
do 31.....	+0.14	-0.14	+2.81	.....
August 8.....	+0.25	-0.25	-0.74	+1.55
do 25.....	+0.70	-0.70	-0.40	-0.83
September 19.....	.....	.....	-0.60	.....
do 26.....	+0.36	-0.36	.....	+0.46
October 18.....	.....	.....	-0.27	.....
do 27.....	.....	.....	+2.06	+0.42
November 20.....	+0.32	-0.32	.....	.....
do 30.....	.....	.....	+3.79	-0.09
December 15.....	-0.27	+0.27	+3.20	.....
1894.				
January 10.....	-0.07	+0.07	*	+0.60
do 29.....	.....	.....	.....	-2.93
February 16.....	+0.50	-0.50	.....	-0.21
March 12.....	+0.02	-0.02	.....	+1.12
do 28.....	+0.26	-5.26	+36.24 *	-0.68
April 12.....	+0.49	-0.49	-0.92	-2.48
do 27.....	+0.40	-0.40	+0.46	+1.80
May 11.....	+0.09	-0.09	+0.08	-3.14
do 29.....	+0.31	-0.31	+1.01	+2.33
June 15.....	.....	.....	+0.51	-1.51
do 29.....	+0.17	-0.17	-0.46	.....

*Owing to the death of Mr. Ashe, the director of the Quebec Observatory, no exchanges were made from 15th December, 1893, to 28th March, 1894. Time has regularly been given to Halifax on the nights of the exchanges of time with the other observatories.

All of which is respectfully submitted.

R. F. STUPART,
Acting Director.

QUEBEC OBSERVATORY.

QUEBEC, QUE., 17th September, 1894.

The Director
Meteorological Service,
Toronto.

SIR,—I have the honour to transmit the following report of the Quebec Observatory for the fiscal year ending 30th June, 1894.

During the first six months of this year I replaced Mr. W. A. Ashe, my predecessor, at the Quebec Observatory, specially during the four months which preceded his death.

In the fall of this year, the exterior of all the buildings were repaired and painted. The transit instrument was placed in another part of the building with the sidereal clock, which is now nearer to the mean time one.

After the decease of Mr. Ashe, I continued as acting director, up to the first of March last, date of my appointment.

In the month of April the electric machine on the citadel, for transmitting the signals for the gun and ball, was put in order. These signals were given regularly each day by telegraph, and if any irregularity occurred in this service formerly it was altogether beyond my control or responsibility.

Towards the end of June, I received the visit of Mr. F. L. Blake sent from your office to inspect and cause necessary changes to be made at this station, and this gentleman left instructions accordingly.

All the observations at the observatory have been made as formerly, and the bi-hourly temperatures have been continued at the citadel since April last.

I have the honour to be, sir,
Your obedient servant,

ARTHUR SMITH,
Director.

ST. JOHN OBSERVATORY.

ST. JOHN, N.B., 24th September, 1894.

R. F. STUPART, Esq.,
Acting Director, Meteorological Service,
Toronto.

SIR,—I have the honour of presenting herewith the report on the St. John Observatory for the year ending the 30th. June, 1894. The chief station routine of meteorological observations have continued as heretofore.

The time service has been very much handicapped owing to the non-arrival of new transit instruments. As previously stated in my report of the 31st October, 1892, the transit instrument was destroyed by fire in the Customs building 19th March, 1892. After fitting up a temporary transit house on the Pugsley building an old Troughton and Sims instrument was loaned me for temporary use, this old instrument is still being used, it is very much worn and inaccurate. I find it impossible to obtain satisfactory observations for time. On the 31st March last, the observatory was removed from temporary quarters in Pugsley Building to the rooms formerly occupied in the Customs building, the arrangements are decidedly better than previous to the fire. The transit house has been considerably enlarged and means of access are better, the transit pier is exactly in same position as formerly.

The sidereal and mean time clocks are inclosed in felt lined vaults, where it is expected the range of temperature will be extremely small.

The time ball apparatus occupies the same position and is similar to apparatus destroyed by fire, with the exception that it will be dropped by electricity direct from office.

After completion of time ball apparatus the daily time signal has been given from northern tower of customs building, and the temporary staff erected on the post office for time ball and storm signals was abandoned.

The storm signals will as formerly be displayed from signal station on the southern tower of customs building.

Anemometer and wind vane have been placed in their old position on time ball tower and connections made with anemograph in office.

I have the honour to be, sir,
Your obedient servant,

D. L. HUTCHINSON
Director.

MCGILL COLLEGE OBSERVATORY,

MONTREAL, 31st December, 1894.

To the Honourable

The Minister of Marine and Fisheries.

SIR,—I have the honour to present the report on this observatory for the year now closed.

Meteorology.—The “chief station” observations of the pressure, temperature and hygrometric conditions of the air; the velocity and direction of the wind; the percentage of bright sunshine and of cloudiness; the character and amount of precipitation; and the general weather conditions, have been made at every fourth hour (beginning at 3^h) throughout the year. The series of bi-hourly temperatures, commenced in 1884, and being supplementary to the above, has also been carried forward without interruption. While the primary object of these observations is to obtain some knowledge of the laws of the diurnal and annual variations of the meteorological elements for this district, they are also of great commercial importance as a record of climate to which authentic reference may be made, as for instance, in connection with loss or damage to property, or as to the varying seasonal effects of climate as regards agriculture. The complete investigation of the climatology of the station can, however, only be properly carried out by means of continuously self-recording instruments, a full equipment of which should be procured, in order that so important a work may be commenced without delay. The telegraphic observations forming a part of the Canadian series of observations, upon which the general weather predictions are based, have been regularly despatched at the hours 8, 15 and 20 to the Meteorological Office, Toronto. Appended hereto is a summary of the meteorological observations of the year. The daily and monthly results have been published in the *Montreal Gazette* and the monthly summaries in the *Canadian Record of Science*.

There has of late years been a very persistent and increasing demand on the part of the public of Montreal and vicinity for special weather forecasts, which under the existing arrangements of the meteorological service I am unable to furnish. The plan of establishing local forecast offices has been adopted with great success in the United States. It is scarcely necessary to point out that in Montreal there are many large and important industries in connection with the prosecution of which a knowledge of the special local weather probabilities is of the highest importance. Facilities for the issuing of local forecasts here, under the direction of the Meteorological Office, would be of very great value to the commercial interests of the city, and would be highly appreciated by the citizens of Montreal.

Time Service.—Determinations of clock errors have been made by the observation of 756 star transits on 134 nights. A determination of the clock errors is made in the following manner:—A comparison of the sidereal clock, and the mean-time clock is obtained on the chronograph. The transits of six stars (one polar star and two equatorial stars, in each of the reverse positions of the instruments) are then observed and recorded on the chronograph. The inclination of the axis is measured before and after the observations of the stars in each position. The observations being completed, the clocks are again compared. The chronograph sheet is then read and the observations recorded, the instrumental errors deduced, and finally the clock errors are obtained. The error of the sidereal clock is allowed to accumulate, whereas the marking of the mean-time clock is made to correspond to the local meantime on the 75th meridian known as Eastern standard time. All the signals issuing from the observatory correspond with the marking of this clock.

The noon time-ball, for the use of shipping, has been dropped on every week-day during the season of navigation. Special signals have also been transmitted daily to the Montreal fire alarm office for the noon stroke on the alarm bells.

By means of the automatic system of clock signals, which has been in use here for several years, a knowledge of standard time has been widely distributed through the corporations and institutions named below:—

The Canadian Pacific Railway Co., transmitting it daily to all stations along their lines to the Pacific coast.

The Grand Trunk Railway Co., through the Great North-western Telegraph Company, for all their lines east of Kingston.

The Great North-western Telegraph Co., transmitting it daily to all the telegraph stations in eastern Ontario and the province of Quebec.

The Harbour Commissioners at Montreal.

The time signals of this observatory are also transmitted through the Great North-western Telegraph Company to Ottawa, for the firing of the noon gun at the Parliament buildings. I regret again to have to state that the imperfect arrangements at Ottawa in connection with this service are such as to make the noon signal quite unreliable as a time standard for Ottawa.

I had the honour, under date Jan. 12th, 1889, to report, making recommendations for the improvement of this service. The proposed changes were approved, but certain difficulties arose which prevented the completion of the work at the time. I understand that the difficulties referred to, do not exist, and would respectfully urge that the service be at once remodeled after the plan proposed in the report above mentioned.

Exchanges of clock signals with the Toronto Observatory were made on 19 days. The average of the differences obtained between the mean-time clocks of the observatories is 0m. 25sec., and the greatest difference on any one day was 0m. 68sec. The comparisons for the year show that the probable error of the time as given by one observatory at any time as compared with that given by the other, is 0m. 20sec.

Soil Temperatures.—The soil temperature observations, commenced in October, 1888, and taken by means of metallic couples in the galvanometer circuit as described in my report for 1888, were discontinued in July, 1892, and have not been resumed. The results obtained by this method, although reliable within a somewhat large range, were never entirely satisfactory. A similar series of observations with thoroughly accurate instruments was commenced on November 1st last, in co-operation with Professor H. L. Callendar of this university, under whose direction the apparatus has been constructed and set up. Platinum thermometers as devised by Professor Callendar are used and are arranged so that one minute on the scale corresponds to one-tenth of a degree. Eight thermometers in all are employed—one to give air temperatures—one on the surface of the ground, and six in the earth at depths as follows:—4-in., 10-in., 20-in., 40-in., 66-in., 103-in. The apparatus forms part of the equipment of the MacDonald Physics building of the university.

METEOROLOGICAL ABSTRACT

OBSERVATIONS made at McGill College Observatory, Montreal, Canada,—Height
C. H. McLEOD,

Number.	MONTH.	THERMOMETER.					*BAROMETER.			
		Mean.	% Devia- tion from 20 years means.	Maximum.	Minimum.	Meandaily range.	Mean.	Maximum.	Minimum.	Meandaily range.
1	January.....	12·99	+1·21	41·2	-12·7	19·72	30·1271	30·776	29·273	·362
2	February.....	12·65	-2·78	38·7	-19·5	16·88	30·1033	30·833	29·462	·299
3	March.....	31·59	+7·20	57·0	5·0	12·34	29·9939	30·419	29·396	·233
4	April.....	44·89	+4·95	69·5	15·0	18·52	30·0177	30·386	29·623	·183
5	May.....	56·04	+1·62	79·0	37·7	18·01	29·9135	30·372	29·436	·197
6	June.....	65·83	+1·03	85·2	44·8	17·16	29·8805	30·213	29·377	·113
7	July.....	68·73	-0·09	89·8	52·0	17·82	29·9214	30·292	29·587	·134
8	August.....	62·82	-3·93	80·6	44·8	16·86	29·9591	30·213	29·666	·129
9	September.....	59·65	+1·13	78·5	35·0	16·22	30·0608	30·626	29·532	·192
10	October.....	48·62	+3·06	65·5	34·1	13·07	29·8942	30·299	29·174	·256
11	November.....	30·23	-2·09	53·6	6·4	12·27	30·0008	30·763	29·387	·272
12	December.....	22·72	+3·94	30·5	11·6	15·93	30·0802	30·535	29·406	·282
13	Sums for 1894.....						29·9960			
14	Means for 1894.....	43·06	+1·27			16·24	29·9790			·226
15	Means for 20 years end- ing Dec. 31 1894.....	41·79								

* Barometer readings reduced to 32° Fahr. and to sea level. + Inches of mercury ‡ Saturation 100. than the average for 20 years inclusive of 1894. The monthly means are derived from readings taken every summit of Mount Royal, 57 feet above the ground, and 810 feet above sea level. ** For eight years only.

The greatest heat was 89·8 on July 2; greatest cold--19·5 on February 10; Extreme range of temperature was 5·2 on March 22. The warmest day was 28 July, when the mean temperature was 80·18. The reading was 30·833 on February 24, the lowest was 29·174 on October 17 giving a range of 1·659 for the hour was 69 on January 30, and the greatest velocity in gusts was at the rate of 84 m. p. h. on January 30, and resultant mileage 50,870. Auroras were observed on 19 nights. Fog on 14 days. Thunderstorms on the winter closed in the city on March 25. The first appreciable snowfall of the autumn was on Novem-

FOR THE YEAR 1894.

above sea level 187 feet. Latitude N. 45° 30' 17". Longitude 4^h 54^m 18^s 55 W.—
Superintendent.

+ Mean pressure of vapour.	+ Mean relative humidity.	Mean dew point.	WIND.		Sky clouded per cent.	Per cent possible bright sunshine.	Inches of rain.	Number of days on which rain fell.	Inches of snow.	Number of days on which snow fell.	Inches of rain and snow melted.	No. of days on which rain and snow fell.	No. of days on which rain or snow fell.	Number.
			Resultant direction.	Mean velocity in miles per hour.										
0766	85.6	9.6	S. 78° W.	17.2	54	45	0.90	7	19.2	15	2.81	2	20	1
0740	81.8	8.1	S. 50° W.	17.8	55	47	0.12	1	9.1	11	1.03	1	11	2
1385	74.5	24.4	S. 49° W.	16.5	59	46	1.45	11	7.4	9	2.19	3	17	3
1840	58.6	30.1	N. 26° W.	16.2	53	55	0.59	8	1.2	1	0.71	1	8	4
3030	67.0	44.2	S. 50° W.	14.7	62	51	3.73	17	.....	.....	3.73	.....	17	5
4991	76.2	57.5	S. 62° W.	14.4	58	30	4.02	17	.....	.....	4.02	.....	17	6
5136	73.2	59.2	S. 58° W.	13.0	53	56	2.82	19	.....	.....	2.82	.....	19	7
4146	71.7	53.0	S. 63° W.	13.7	57	47	1.80	16	.....	.....	1.80	.....	16	8
4141	79.6	52.9	S. 31° W.	12.7	54	34	2.73	14	.....	.....	2.73	.....	14	9
2801	80.7	42.6	S. 62° W.	11.8	70	21	4.03	22	Map.	2	4.03	1	23	10
1446	80.1	24.7	S. 68° W.	15.9	75	27	1.47	5	11.0	12	2.10	.....	17	11
1144	81.4	17.8	S. 79° W.	16.5	63	34	0.55	5	23.0	16	2.79	.....	21	12
2630	75.9	35.3	.....	15.01	59.4	41.1	24.21	142	70.9	66	30.76	8	200	13
2507	74.5	.....	.....	**15.18	67.2	845.4	.....	.....	.....	.....	2.57	.....	17	14
.....	.....	.....	.....	.....	.....	.....	17.98	133	120.0	81	39.67	16	200	15

§ For 13 years only. ¶ “+” indicates that temperature has been higher; “—” that it has been lower 4 hours, beginning with 3-hour on. Eastern Standard time. The anemometer and wind vane are on the

rate was therefore 109.3. Greatest range of the thermometer in one day was 39.5 on January 25; least coldest day was February 24 when the mean temperature was 12.53 below zero. The highest barometer year. The lowest relative humidity was 17 on April 14. The greatest mileage of wind recorded in one The total mileage of wind was 131,482. The resultant direction of the wind for the year is S. 62° W., 20 days and lightning without thunder on 7 days, lunar halos or coronas on 14 nights. The sleighing of ber 5. The first permanent sleighing of the winter was on December 27.

REPORT OF KINGSTON OBSERVATORY.

KINGSTON, 4th January, 1895.

WM. SMITH, Esq.,

Deputy Minister of Marine and Fisheries.

SIR,—I have the honour to submit for the information of the Minister of Marine and Fisheries the following report of the Kingston Observatory.

Since last report a ring micrometer for the equatorial, and a new diagonal eyepiece for the transit together with a spare web, have been received from Fauth & Co., Washington. The lenses of the object glass of the equatorial also have been repolished at the establishment of Messrs. Alvan Clark & Sons, their original makers, and their performance is now excellent and still better than before. Considerable expense has necessarily been incurred in connection with these additions and improvements, and has been defrayed by the director.

It is but just here to say, that the sidereal clock received a few years ago from Messrs Fauth & Co., and constructed by them, has proved to be not inferior in accuracy and regularity of time keeping to the sidereal clocks of the most thoroughly equipped observatories in Europe and the United States, and is a great aid to accuracy in our observations here.

The time has been regularly given throughout the year to the city and shipping. The hot water coil introduced from an adjoining building into the observer's room, where the compensated mean time clock is placed, worked well, and any necessary repairs have been made to the observatory building from time to time. All which is respectfully submitted by.

JAS. WILLIAMSON,

Director, Kingston Observatory.

APPENDIX No. 5.

REPORT OF THE CHAIRMAN OF THE BOARD OF STEAMBOAT INSPECTORS.

OTTAWA, November, 1894.

Sir CHARLES HIBBERT TUPPER,
Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honor to submit herewith the annual report for the year ending 30th June, 1894.

The report contains the total number of steamboats in the Dominion as known to the inspectors. Form No. 1 showing the steamboats which were inspected, and form No. 2, showing the steamboats not inspected; form No. 4, shows the number of steamboats added to the Dominion, and form No. 5, the number of steamboats lost, broken up, or otherwise put out of service.

Tables A, B and C show the total number of steamboats in the Dominion and their gross tonnage, the amount of dues and fees collected and the number of steamboats added to the Dominion with their gross and registered tonnage.

A.—NUMBER of steam vessels inspected and not inspected reported by the Inspectors of Steamboats in the Dominion and their gross tonnage during the year ending 30th June, 1894 :—

DIVISION.	Number of Vessels.	Gross Tonnage.
West Ontario, Huron and Superior.....	349	71,642 00
Kingston.....	167	25,491 54
Montreal.....	110	13,165 00
Quebec.....	183	44,031 00
Maritime Province, Nova Scotia.....	99	27,902 39
do New Brunswick and Charlottetown.....	135	17,412 26
British Columbia.....	142	20,545 78
Manitoba, Keewatin and North-west Territories.....	77	9,730 72
Total.....	1,262	229,920 69

B.—DUES and fees collected on account of Steamboat Inspection during the year ended 30th June, 1894 :—

DIVISION.	Amount.
	\$ cts.
West Ontario, Huron and Superior.....	7,117 60
Kingston.....	2,830 57
Montreal.....	1,342 22
Quebec.....	4,164 60
Maritime Province, N.S.....	2,468 56
do N.B., and Charlottetown.....	1,944 37
British Columbia.....	2,326 60
Manitoba, Keewatin and North-west Territories.....	479 32
Inspecting passenger tow barges.....	180 00
Engineers' Certificates.....	571 00
Total.....	23,424 84

C.—NUMBER of steam vessels added to the Dominion during the year ending 30th June, 1894 :—

DIVISION.	Number of Vessels.	Gross Tonnage.	Register Tonnage.
West Ontario, Huron and Superior	23	2,591 00	1,481 00
Kingston	6	1,977 79	1,145 86
Montreal	3	137 00	109 00
Quebec	19	2,054 00	1,224 40
Maritime Provinces, N.S.	5	1,302 06	805 73
do N.B., and Charlottetown	10	1,039 60	659 10
British Columbia	17	1,749 16	4,047 17
Manitoba, Keewatin and North-west Territories	9	447 80	349 18
Total	92	11,298 40	6,821 44

BOARD MEETINGS.

A meeting of the Board of Steamboat Inspection was held at Ottawa from 9th to 19th January inclusive, composed of the inspectors from Toronto, Kingston, Montreal, Quebec, St. John and Halifax.

The meeting was for the purpose of examining draft of new bill prior to the consolidation of the present Acts, whereby the law may be made more workable and comprehensive. The meeting was also a great advantage to the service and the inspectors, giving them an opportunity to discuss and exchange views in connection with their experience, and the requirements in their separate divisions: the result of this will be a more uniform working of the Act and mode of inspection.

March 27th.—A quorum of the board met at Kingston. The members present were Mr. John Dodds, J. Johnston, E. Adams and W. J. Meneilley, Chairman, for the purpose of considering the question of increasing the working pressure to be allowed on boilers, as built under part 1 of the rules, bringing them into uniformity with rules used in Great Britain. Rules were formulated and recommended, which were approved by His Excellency the Governor in Council on the 9th April, 1894.

June 8th.—A quorum of the board met at Montreal, the members present were Mr. Wm. Laurie, J. Samson, E. Adams and W. J. Meneilley, Chairman, for the purpose of examining Mr. James Ray and Louis Arpin, candidates for the position of steamboat inspectors, and examining and approving of the examination papers of candidates for engineers' certificates.

AMENDMENTS TO THE ACT.

Section 4 of the Act 49 Vic., chap. 78, as amended by section 2 of chap. 26 of the Statutes of 1888, also section 55 of the Act, were repealed, and substituted by the Act 57-58 Vic., chap. 46.

INSPECTORS APPOINTED.

During the year changes have taken place in the personnel of the staff, Mr. C. R. Coker, hull inspector for Maritime Provinces was retired from the service on account of age and failing health. The district being so large and to accomplish the work more satisfactory to the public, it became necessary to divide it between Nova Scotia and New Brunswick, appointing by Order in Council, 28th April, 1894, Mr. S. R. Hill, at Halifax, as hull inspector for the Nova Scotia Division, at a salary of \$1,000 per annum, commencing his duties 30th April, and Mr. I. J. Olive, at St. John, as hull inspector for the New Brunswick and Charlottetown Division, at a salary of \$1,000 per annum commencing his duties 25th April, 1894.

Mr. G. T. Clift, boiler inspector for Montreal, was retired from the service. Mr. Wm. Laurie, who passed a satisfactory examination 14th May, 1892, for the position of

boiler inspector, was appointed inspector for that district by Order in Council, 28th April, 1894, at a salary of \$1,200 per annum, commencing his duties 30th April.

The amount of work entailed on the Montreal district, and the inspection of ships' hoisting gear and tackle being added to the steamboat inspector's duties, it was found necessary to appoint an assistant, and Mr. Louis Arpin, who passed a satisfactory examination 8th June, was appointed to the position by Order in Council, 25th July, 1894, at a salary of \$1000 per annum, commencing his duties 14th August, 1894.

Owing to physical inability, Mr. W. J. Meneilley, chairman, was retired from the service, 30th June, 1894, by Order in Council, on a superannuation allowance of \$769.28 per annum.

CASUALTIES.

I regret having to report the loss of fifty-seven lives; twenty-two from fire, one of the most dreaded accidents that can befall a steamboat; thirty-one from vessels foundering from stress of weather, two from an accident to str. "Rustler" by striking the dock and breaking the steam pipe and two from the collision of str. "Ocean," with American barge "Kent."

The steamboats lost and casualties are as follows:

West Ontario and Huron Division.

July 7th, 1893.—Str. "Rosedale," of Toronto, en route from Fort William to Duluth, stranded at Knife River, Lake Superior, during a fog; was afterwards released and repaired; cost, \$5,000.

August 10th, 1893.—Str. "Pacific," of Owen Sound, broke her crank shaft, a new steel shaft was put in, cause of breakage, flaw in after crank pin.

September 13th, 1893.—Str. "Byron Terrace," of Wallaceburg, while lying wind-bound at Leamington on Lake Erie, took fire and was burned; total loss; cause of fire unknown. Three lives were lost.

October 15th, 1893.—SS. "Monarch," of Sarnia, en route from Sarnia to Duluth, encountered a heavy gale of wind on Lake Huron and her rudder post broke she drifted across the lake and was brought up by her anchors off Port Elgin, temporary repairs were made to enable her to return to Sarnia.

November 14th, 1893.—SS. "Athabasca," of Montreal, en route to Fort William, collided with str. "Colgate," in Sault Ste. Marie River, her bow was stove in, she proceeded to Fort William and discharged her cargo and returned to Detroit, Michigan, where the damage was repaired; cost of repairs \$4,000.

November 17th, 1893.—The tug "George Douglas," of St. Catharines, en route from Lions Head to Owen Sound, took fire opposite Griffiths Island, Georgian Bay; and was totally destroyed, the crew escaped in the yawl boat, cause of fire unknown.

December 4th, 1893.—SS. "Myles," of Hamilton, lost her rudder and shoe in a heavy gale and snowstorm on Georgian Bay; after drifting about the bay for several hours, she was picked up by the government cruiser "Petrel" and towed to Owen Sound where the necessary repairs were made.

April 18th, 1894.—SS. "Excelsior," of Toronto, lying at the wharf at Huntsville, was burned; total loss; cause of fire from the burning of buildings on wharf.

May 1st, 1894.—Str. "Truant," of Toronto, while ashore on "Burnt Island Reef," Georgian Bay, took fire and was a total loss; cause of fire supposed to be from around the boiler.

June 7th, 1894.—SS. "Ocean," of St. Catharines, en route from Montreal to Hamilton, collided with the American barge "Kent" near the Sister Light, River St. Lawrence, and sank; she was raised and repaired at Deseronto, two lives lost; cost of repairs \$7,500.

East Ontario Division.

August 31st, 1893.—SS. "Dominion," of Port Hope, was destroyed by fire while lying at the dock, becoming a total loss. Cause of fire supposed to be from cook stove.

September 4th, 1893.—Str. "North King," of Kingston, while proceeding up Bay of Quinté, struck a rock shoal near Belleville, breaking her steam pipe, and damaging bottom of hull, was docked at Kingston and repaired, no loss or injury to life.

June 1, 1894.—SS. "Magnet," of Montreal, bound down the River St. Lawrence with passengers, stranded in the Coteau Rapids, was afterwards released and docked at Montreal, no loss or injury to life.

July 27, 1893.—Str. "James Swift," of Kingston, broke her crank shaft at after bearing, causing the breaking of bed plate and cylinder cover. Cause, from flaw in the iron.

Montreal Division.

No report of accidents.

Quebec Division.

August 10, 1893.—SS. "Otter," while on a voyage from Quebec to Natashqua broke her crank shaft, being the size required by the rules, was caused by defect in the forging.

September 6, 1893.—SS. "Beaver," ran ashore during a fog at Chloridormes on Gaspé coast, and became a total loss. No loss or injury to life.

July, 1893.—Tug "Activity" took fire while lying at the Government wharf at Lévis, was burned to the water's edge. Cause unknown, amount of damage \$1,000.

November 7, 1893.—Str. "John Fraser," of Ottawa, while towing on Lake Nipissing, took fire, was totally burned and sank, causing a loss of nineteen lives.

Maritime Provinces.

July 5, 1893.—Str. "St. Lawrence" while en route from Charlottetown, P. E. I., to Pictou, N.S., broke her starboard crank shaft, was towed back to Charlottetown, where both port and starboard shafts were renewed. Cause of accident unknown.

September 5, 1893.—Str. "Rustler" ran into wharf at Keers' Mills, Miramichi River, a timber of which passed through cabin, breaking main steam pipe, causing the loss of two lives, and scalding several others. An investigation was held as to the cause of accident, by Mr. Meneille, chairman, whose opinion was that the accident "was caused by non-compliance with the law in regard to the lights and rules."

August 21, 1893.—SS. "Dorcas," with the barge "Etta Stewart" in tow, went ashore on Shuter Island, Halifax County, during a very heavy gale, the crew of both steamer and barge, twenty-four in all, were drowned. An inquiry into cause of disaster was held by Captain Smith, R.N.R., whose decision was that no blame could be attached to any person.

British Columbia Division.

October 21, 1893.—SS. "Burt," during a dense fog, ran into a boom of logs, damaging hull, bilge and propeller shaft, was towed to Victoria, hauled out and repaired.

August 15, 1893.—Str. "Mascotte," while at anchor in Pachena Bay, during the night, took fire, and was destroyed. Cause unknown.

November 24, 1893.—SS. "Phantom," while on passage from Victoria to Nanaimo, got ashore in a gale of wind, and became a total loss. No loss or injury to life.

February 4, 1894.—SS. "Estelle," on a voyage from Nanaimo to Discovery Passage, touched on reef off Cape Mudge, in a heavy gale of wind, and foundered. All hands were lost.

June 11, 1894.—Str. "City of Nanaimo" broke her starboard propeller shaft when going into Nanaimo harbour, returned to Vancouver with port engine, where a new shaft was made and fitted.

June 28, 1894.—Str. "R. P. Rithet" broke paddle shaft, was towed to Victoria, and the paddle shaft was replaced.

June 28, 1894.—Str. "Wm. Irving," while towing the "R. P. Rithet" from Hall's Landing to New Westminster, was carried by the current against a bluff, sinking in shallow water. Hull was wrecked.

Manitoba, Keewatin and North-west Territories.

June 17th, 1894.—SS. "Millie Howell," of Selkirk, broke her cross-head causing cylinder head to be knocked out, was taken to Winnipeg for repairs.

July 7th, 1893.—Tug "Anglin" broke after coupling on propeller "Shaft." Temporary repairs were made until a new one was provided.

July 24th, 1893.—SS. "Kennina." Boiler was scorched under a strange engineer when it became leaky in crown sheet and upper tubes, was afterwards caulked and tubes expanded; examined by Mr. Robertson, boiler inspector, who reports little damage done.

August 10, 1894.—SS. "Sultana," of Selkirk, when about twenty miles north of Reindeer Island, the main steam pipe drew out of the elbow, there being only two threads holding it; temporary repairs were made to bring her to port, when it was properly secured. No damage, nor loss or injury to life.

PROSECUTIONS FOR VIOLATION OF THE STEAMBOAT INSPECTION ACT.

Proceedings ordered and results in each case.

Sept. 22nd, 1893.—Str. "Erastus Wiman." Proceedings were ordered to be taken for the carrying of passengers, and at the same time towing a scow having passengers on board, neither vessel having a certificate of inspection. The case was tried at Bracebridge, Ont., 29th November, 1893, and following fines imposed:—

Capt. Denton, as owner of tug	\$20
" " of scow	50
Capt. McKenney as master	20

Sept. 19th, 1893.—Str. "Harvey Neelon." Proceedings were ordered for the prosecution of the owner and master for running without a certificated master. October 24th.—Owner made settlement by paying the penalty provided by the Act.

1st. For employing a master not having a certificate	\$100
2nd. For master himself not having a certificate	100

By Order in Council of the 16th November, 1893, the fines were remitted, less the costs, as evidence had been furnished showing that the permanent master had taken ill and his place was filled by a temporary master, who, on being informed that he could not legally take charge without a certificate, went up for examination and obtained a master's certificate of competency.

October 2nd, 1893.—SS. "Miramichi, B. C." Proceedings were ordered against the owner, summons was served on Mr. Holman, master, for neglecting to cause an inspection to be made. The master pleaded guilty, the justice inflicted the penalty prescribed by section 10 of the act, viz., \$400 with costs, the penalty was not paid. The steamer was sold to pay fine 22nd September, 1894, at the City of Vernon B. C.

Proceeds of sale	\$180
Less expense	30
Net proceeds	<u>\$150</u>

September 5th, 1893.—Strs. "R. Stoker," "Wm Paul," "C. W. Dennis," and "Tim Doyle." Proceedings ordered to be taken against them for running without

certificates of inspection. Cases were heard 22d and 23d October, 1893, before His Honour Judge Desnoyers at Montreal. His decision was given on the 28th February, 1894, imposing a penalty of \$25 and costs in each case. Sect. 10 of chap. 78-49 Vic. provides that penalty shall be \$400.

The several fines imposed were deposited to the credit of the Receiver General, 12th April, 1894. Total \$100.

October 19, 1893.—Strs. "Pert" and "Gwendoline," B.C. Proceedings were ordered to be taken against the owners for running without a certificate of inspection. Owners willingly submitted to pay minimum fine, under section 16 of the Act as amended by chap. 39 of the Acts of 1891, which is \$50 in each case. The sum of \$100 was deposited to the credit of the Receiver General, April 14th, 1894.

Sept. 18th, 1893.—Str. "Saskatchewan," of Winnipeg. Proceedings were ordered to be taken against owner, master and engineer for carrying passengers without having a certificate of inspection or a certificated engineer. The case of Mr. J. A. Walker who was acting as engineer was tried before the police magistrate at Winnipeg. He was fined \$100.

The case of Mr. Peter McArthur, owner, for employing an uncertificated engineer, and carrying passengers without a certificate of inspection, was tried before county court judge at Portage la Prairie, defendant admitted the charges, was fined for employing uncertificated engineer, \$100 and costs \$3.50.

For carrying passengers without having a certificate \$50 and costs \$1.25. The fines were deposited to the credit of the Receiver General 12th January, 1894.

Sept. 8th, 1893.—Str. "Caledonia," B.C. Proceedings were taken against the owners for not having certificated engineer employed. The case was tried before H. A. Miller and Benjamin Duglus, J. P., Vancouver, B.C., 12th October, 1893. Case dismissed with costs \$33.80.

Magistrates dismissed the case on the grounds that the occasion was an extraordinary one and the company was within the provision of the 43rd section of the Act.

October 17th, 1893.—Str. "Golden City," of Peterboro'. Proceedings were taken against owner :

1st For running without a certificated engineer previous to 8th July, 1893.

2nd Carrying more passengers than certified for.

3rd Running at different times without a certificated master in charge.

The case was brought before the magistrate at Peterboro' 5th December, 1893, when defendant pleaded guilty to hiring an engineer not having a certificate, for which he was fined \$100 and costs. The magistrate being in doubt as to his power to dispose of charge No. 3 it was enlarged until 22nd January, 1894, when the defendant was fined \$100 and costs \$5.75. Charge No. 2, not tried, evidence not warranting it.

March 22nd, 1894.—Information laid by Thomas Donnelly, hull inspector, before G. Edmoson, police magistrate county of Peterboro, that S. Reynolds, owner of steamer "Golden City," employed an engineer without a certificate 6th July, 1893. The defendant appearing and pleading guilty was fined \$100 and costs. Total fines \$300.

The question of the charge for running in violation of the Act before the 8th of July, 1893, was reconsidered by the department. It was found that the "Golden City" did not carry passengers previous to the 8th of July, and a certificated engineer would not be required, but for some reason the owner pleaded guilty to having run his steamer illegally after the 8th of July. This was found to be an error as he had an engineer duly qualified after that date and consequently did not violate the law. The fines in both cases were remitted and the costs retained, by Order in Council 24th July, 1894.

December 29th, 1893.—SS. "Georgia Blake," "Frank Reid," "Eagle" and "Maggie May." Proceedings were taken for violation of the Steamboat Inspection Act on following charges. The cases were tried before the magistrate at Little Current, 6th June, 1894. Tug "Maggie May," carrying passengers without necessary certificate of inspection, fined \$50.

Employing person as engineer having no certificate while carrying passengers, fine \$100, "Frank Reid". Same charges as above steamer both charges were sustained and fine of \$50 and \$100 respectively were paid.

Tug "Eagle." Charges same as above case. At the trial a certificate of inspection was produced when the first charge was dismissed. In the second charge, the owner pleaded guilty and was fined \$100.

In the case of the "Georgia Blake" the facts did not bear out the charges. A petition was received from the inhabitants of the locality for remission of the fine, for the reason that it had been the practice for twenty years, in cases of emergency and when there was no other accommodation, to run the steamers, and they were not aware that they were violating the law, and in future will comply with the requirements of the Act. The Hon. Minister of Marine and Fisheries recommended that the penalties be remitted and the offences condoned, provided that all costs should be paid by owners. By Order, in Council 3rd November, 1894, the fines were remitted.

December 22nd, 1893.—Tug "Grace Darling." Proceedings were taken for violation of the Steamboat Inspection Act and the Masters and Mates Act. The case came before the police magistrate for Algoma, at Massey, 13th March, 1894. The defendant pleaded guilty to the three charges and was fined \$100 in each case: 1st, carrying passengers, 22nd October, 1893, without certificate of inspection authorising such; 2nd, ditto on 28th November, 1893; 3rd, employing uncertificated engineer while carrying passengers.

Representations were made showing that the owner of the tug had not intentionally violated the law. The circumstances as set forth by those who were on board the tug as passengers were as follows: The tug picked up a number of persons who were in a sailing boat on their way to a church service on Sunday. The wind being unfavourable for the sail boat the captain of the tug took the boat in tow; a few of the persons went on board the tug to warm themselves but no fare was charged nor did it appear that the captain of the tug had any intention of doing more than rendering assistance to the persons on the way to the church at their earnest request. In view of the circumstances the fines were remitted on payment of all the costs in the cases, by Order in Council of the 16th April, 1894.

December 21st, 1893.—Str. "Penticton," B.C. Proceedings were ordered to be taken against Mr. Thos Ellis, of Penticton, B.C., as owner for carrying dynamite contrary to law. It was ascertained that, at the time of committing the offence, the steamer was held and ran by Mr. Thomas Riley under charter. Mr. Riley was brought before Mr. Price Ellison, stipendiary magistrate for the district, and committed for trial at the next court of competent jurisdiction. His counsel applied to the county court judge for an opportunity of electing to take a speedy trial which was allowed. Mr. Riley pleaded guilty and expressed regret for his offence—was fined \$50 which was forwarded to department, 20th June, 1894.

September 7th, 1893. Str "Rocket." Proceedings ordered to be taken against owner for infraction of the Steamboat Inspection Act. Case came up before the police magistrate at Cornwall, 30th September, 1893, and adjourned until October 4.

The charges were for running vessel without certificate of inspection, and for carrying passengers without certificate from May to August 23, 1893.

Magistrate dismissed case and appeal was made by the attorney for the Crown.

The case came up before Judge Pringle at Cornwall, 12th June, 1894, defendant pleaded guilty, was fined \$50 and full costs of court.

The penalty and costs were not paid, proceedings have been taken to sell the boat for payment of costs and penalty.

June 28th, 1894. Strs. "Mary Arnott," "Verbena May," "Victoria" "Ocean Lily." Proceedings were ordered to be taken against the owners on following charges: Running without having the certificate of inspection posted on board, a copy of the certificate was not delivered to the collector of customs, and not having the vessel inspected.

The papers in those cases are still in the Justice Department, no decision being yet arrived at.

May 7, 1894.—Strs. "Lady of the Lake." Proceedings were ordered to be taken against the owner, G. F. Marsh, for violation of the steamboat inspection law.

The case was tried before the magistrate at Bracebridge, Ont., 29th June, 1894. The defendant was fined \$50 and costs. The amount of fine, \$50, was deposited to the credit of the Receiver General, 18th July, 1894.

October 21st, 1893. Strs. "J. W. Steinhoff." Proceedings were ordered against vessel or owner for running in violation of Steamboat Inspection Act.

Summons was served on Mr. Nelson Wigle, master in charge, for making a voyage with excursionists on board in waters beyond the limits mentioned on her certificate of inspection. The case was tried by G. W. Dennison, police magistrate, Toronto, November 1st, 1893, and adjourned until 3rd, 10th and 13th instant, when the defendant pleaded guilty, was fined \$50 to be paid forthwith. Costs \$24.30.

Capt. Wagle paid fine and cost under protest 18th August, 1894.

PENALTIES RETAINED.

Tug "Erastus Wiman" and scow, penalty imposed 29th November, 1893, Captain Denton, as owner, \$70; Captain McKenney, as master, \$20.

Str. "Miramichi," B. C., fine imposed November, 1893, \$400, not paid. Vessel was sold 22nd September, 1894. Net proceeds of sale, \$150.

Tugs "R. Stoker," "Wm. Paul," "C. W. Dennis," "Tim Doyle," of Montreal, fines imposed 28th February, 1894, each \$25; total, \$100.

Strs. "Pert" and "Gwendoline," B.C., fine imposed 14th April, 1894, each \$50; total, \$100.

Str. "Saskatchewan," of Winnipeg, fine imposed on Mr. J. A. Walker, 23rd October, 1893, for acting as engineer without a certificate, \$100; Peter McArthur, as owner, \$150.

Str. "Golden City," of Peterboro', fine imposed on owner, 22nd January, 1894, running without certificated master, \$100.

Str. "Penticton," of British Columbia, fine imposed for carrying dynamite contrary to law, \$50.

Str. "Lady of the Lake," fine imposed 29th June, 1894, for carrying passengers not having a certificate authorizing such, \$50.

Str. "Steinhoff," Captain Nelson Wagle, fine imposed 13th November, 1893, for running steamer with excursionists on waters beyond the limits mentioned in the steamer's certificate, \$50.

I have the honour to be, sir, your obedient servant,

EDWARD ADAMS,

Chairman Board of Steamboat Inspection.

APPENDIX No. 6. LIVE STOCK SHIPMENTS.

Record of Live Stock shipped from Port of Montreal during Month of May, 1894.

Number.	Date.	Steamer.	Destination.	SHEEP.		*CATTLE.			Fees Collected.	HORSES.		SWINE.		Grain for Feed.	Number Men.	
				Shipped.	Lost.	Pat.	Stockers.	Total.		Lost.	Shipped.	Lost.	Shipped.			Lost.
1894.																
1	May	2. Lake Huron.	Liverpool.	194	2			672	22 10	5				157,260	28	
2	do	4. Sarnatian	Glasgow.					291	8 73	196				73,160	27	
3	do	6. Austrian.	London.					371	11 13				1	120,000	15	
4	do	8. Hestia	Glasgow	400	3			361	14 83	70				91,225	16	
5	do	8. Toronto	Liverpool.					400	12 00					96,581	16	
6	do	8. Gerona.	London.					512	15 36					134,390	22	
7	do	8. Parkmore.	Liverpool.					407	12 21					96,930	16	
8	do	9. Pickhuben.	London.					296	8 88					75,000	12	
9	do	9. Lake Ontario.	Liverpool.					543	16 29	20				137,865	23	
10	do	9. Pomeranian.	Glasgow.	501				334	15 03	107				91,760	19	
11	do	9. Virginian	Liverpool.					313	9 39					73,450	12	
12	do	12. Warwick	Bristol.	191	1			175	7 16					63,750	8	
13	do	12. Fremont.	London.					390	11 70					117,320	16	
14	do	12. Dominion.	Bristol.					357	10 71					89,770	14	
15	do	12. Laurentian	Liverpool.					510	15 30					114,921	21	
16	do	12. Rosarian	London.	101				438	14 15	11				114,000	19	
17	do	15. Amaranthia	Glasgow	164				455	15 29	95				112,051	20	
18	do	15. Mariposa.	London.	49				16	5 46					16,650	7	
19	do	16. Lake Nepigon.	Liverpool.					332	9 96					82,815	14	
20	do	16. Hibernian.	Glasgow					201	6 03	93				73,630	11	
21	do	16. Baumwell	London.					190	5 70					48,000	8	
22	do	17. Anvers	do					181	5 43					50,000	7	
23	do	18. Hamilton	Bristol.	525				222	11 91					68,810	12	
24	do	18. Oregon	Liverpool.					174	5 22					41,000	7	
25	do	20. Baltimore.	do	530				298	12 14	21				63,520	12	
26	do	22. Dracona	London.					279	8 37					19,000	11	
27	do	22. Stenehoff.	do					211	6 33					51,100	9	
28	do	22. Tritonia	Glasgow	91				505	16 06	44				128,750	22	
29	do	Lake Superior	Liverpool.					557	16 71	20				135,560	22	

RECORD of Live Stock Shipped from Port of Montreal during 1894—Continued.

Number.	Date.	Steamer.	Destination.	SHEEP.		*CATTLE.			Fees Collected. \$ cts.	HORSES.		SWINE.		Hay for Feed.	Grain for Feed.	Number of Men.
				Shipped.	Lost.	Pat.	Stockers.	Total.		Lost.	Shipped.	Lost.				
1894.																
30	May 23	Brazilian	London.					464	13 92	41				120,000	46,420	20
31	do 24	Canadian	Glasgow.					170	5 10	56				52,660	20,390	9
32	do 24	Memphis	Bristol.	500				57	6 71					28,680	11,510	6
33	do 25	Concordia.	Glasgow.	1,904				150	23 54					90,000	34,000	14
34	do 26	Wentmore.	Liverpool.	375				461	17 58					133,540	50,710	18
35	do 26	Mongolian.	do					431	12 93					107,700	49,000	17
36	do 27	Sarnia.	do					190	16 55					69,750	29,000	13
37	do 27	Escalona.	Newcastle.					279	8 37					68,900	24,000	11
38	do 29	Indraui.	Glasgow.					180	5 40	65				60,600	21,000	7
39	do 30	Italia.	London.					193	5 79					48,250	19,300	7
40	do 30	Lake Winnipeg.	Liverpool.					577	17 31					139,750	50,220	22
41	do 30	Mennon.	London.	895				65	10 90					41,520	20,000	7
42	do 30	Buenos Ayrean.	Glasgow.					241	7 23	148				83,825	36,490	14
43	do 31	Barrowmore.	Liverpool.					716	21 48					179,000	64,400	28
44	do 31	Texas.	Bristol.	1,416				246	21 54					89,000	35,640	16
		Total		9,370				14,341	523 93	982				3,888,743	1,556,985	655
Same period, 1893.																
		do		101				15 3 6	306 72	286						
		1892.		391			424	16,711	334 22	511						
1895.																
45	June 1	Gerona.	London.					541	16 23	20				135,250	50,000	22
46	do 2	Numidian	Liverpool					512	15 36					117,780	43,720	21
47	do 2	Avlona.	London.					339	10 17					100,000	31,000	14
48	do 5	Waudrahm.	do					363	10 89					90,750	32,670	14
49	do 6	Lake Huron.	Liverpool					704	21 12	1				168,840	63,450	28
50	do 6	Aseyrian.	Glasgow.					238	8 04	80				68,810	24,330	11
51	do 7	Montevidean	London.					485	14 55					110,700	43,700	21
52	do 7	Mexico	Bristol					263	12 79					84,370	29,645	13
53	do 7	Alcides	Glasgow.	490	1			226	6 78					60,800	20,000	9
54	do 10	Toronto.	Liverpool					530	15 90					130,720	47,880	21
55	do 10	Tona.	London.					555	16 05	17				135,520	53,100	23

56	do	11	Parkmore.....	Liverpool	651	19 53'	156,070	58,500	26
57	do	13	Lake Ontario.....	do	424	12 72	37,850	38,250	17
58	do	13	Sarnian.....	Glasgow	481	19 42	120,700	49,000	22
59	do	13	Storm King.....	London.....	84	2 52	25,200	8,400	3
60	do	14	Merrimac.....	do	375	13 07	108,030	37,810	15
61	do	14	Dominion.....	Bristol	425	12 75	107,050	36,110	17
62	do	15	Virginian.....	London.....	545	22 33	155,200	58,000	24
63	do	16	Laurentian.....	Liverpool	676	20 28	156,030	53,000	29
64	do	16	Austrian.....	London.....	368	11 04	111,250	37,820	15
65	do	17	Hestia.....	Glasgow	445	13 35	98,750	35,550	18
66	do	19	Stubbenhuk.....	London.....	395	11 85	96,030	33,000	15
67	do	20	Pomeranian.....	Glasgow	337	10 11	109,000	36,800	13
68	do	20	Lake Nepigon.....	Liverpool	331	9 93	85,820	29,890	14
69	do	20	Gerona.....	London.....	656	19 68	168,830	59,880	26
70	do	21	Hamilton.....	Bristol	221	13 65	75,250	25,500	13
71	do	22	Warwick.....	do	268	21 80	114,500	33,440	17
72	do	23	Rosarian.....	London.....	447	13 41	120,800	40,230	18
73	do	23	Baltimore.....	Liverpool	394	14 16	109,930	37,260	17
74	do	24	Oregon.....	do	401	12 03	90,000	32,080	16
75	do	26	+Navarre.....	do	212	6 36	53,827	19,410	8
76	do	26	Amarynthia.....	Glasgow	196	22 80	116,610	53,000	15
77	do	27	Lake Superior.....	Liverpool	490	18 84	119,580	50,580	20
78	do	27	Hibernian.....	Glasgow	301	9 03	75,000	24,000	12
79	do	28	Pickhuben.....	London.....	401	12 03	96,690	34,290	16
80	do	28	Memphis.....	Bristol	297	13 89	75,500	31,500	14
81	do	30	Mongolian.....	Liverpool	142	4 26	32,600	12,800	7
Totals June				14,749	509 32	3,879,540	1,405,645	623	
Reported 31st May, 1894				14,341	623 98	3,898,743	1,556,985	655	
Totals May & June				29,090	1,033 25	7,778,283	2,962,630	1,278	
Corresponding date 1893				33,389	764 70				
do 1892				35,111	702 22				

* All fat cattle shipped this season. † Went ashore on Isle Ronde, opposite Montreal; live stock taken to stock yards. ‡ No. lost at sea; returns not complete.

82	July	1	Sarnia.....	Liverpool	118	3 54	27,360	10,420	6
83	do	1	Freemona.....	London	300	9 00	88,184	31,820	12
84	do	4	Lake Winnipeg.....	Liverpool	313	15 33	96,405	60,140	15
85	do	4	Barrowmore.....	do	191	26 17	103,230	87,920	17
86	do	4	Canadian.....	Glasgow	355	10 65	87,530	32,030	14
87	do	4	Brazilian.....	London	249	7 47	90,020	21,520	10
88	do	5	Tritonia.....	Glasgow	317	26 40	106,400	50,180	21
89	do	5	Concordia.....	Bristol	269	6 27	48,000	18,810	8
90	do	7	Buenos Ayrean.....	Liverpool	633	18 99	146,630	59,100	27
91	do	10	Mariposa.....	London	212	21 00	91,060	40,000	16
92	do	10	Indrani.....	Glasgow	459	15 44	119,750	51,410	19
93	do	10	Escalona.....	London	342	12 06	93,000	30,530	15

RECORD of Live Stock shipped from Port of Montreal, during 1894—Continued.

Number.	Date.	Steamer.	Destination.	SHEEP.		Fat.	* CATTLE.			HORSES.		SWINE.		Hay for Feed.	Grain for Feed.	Number of Men.
				Shipped.	Lost.		Stockers.	Total.	Lost.	Shipped.	Lost.	Shipped.	Lost.			
1894.																
94	July 10.	Baumwall	do						363					95,700	34,600	16
95	do 10.	Dracona	Newcastle	433	6				152					56,400	27,910	8
96	do 11.	Awyrian	Glasgow						399					119,930	37,900	16
97	do 11.	Montevideo	London						427					110,000	35,000	17
98	do 11.	Lake Huron	Liverpool	810					608					163,830	69,650	28
99	do 13.	State of Georgia.	Newcastle	340					234					74,950	24,750	11
100	do 13.	Mexico.	Bristol	341	3				283					80,320	29,710	13
101	do 15.	Toronto.	Liverpool	317					480					128,125	48,000	21
102	do 15.	Parkmore.	do	1,114	4				675	1				211,450	81,150	32
103	do 17.	Hurons	London	456					465					148,910	52,600	20
104	do 18.	Lake Ontario.	Liverpool	165					539					128,825	50,110	23
105	do 18.	Dominion.	Bristol	90					428					110,000	38,000	18
106	do 19.	Sarnatian.	Glasgow						648					149,050	53,800	26
107	do 20.	Aleides.	Bristol	851	4				260					88,165	36,110	13
108	do 21.	Numidian.	Liverpool						600					134,740	54,100	25
109	do 21.	Iona	London.	694	2				397	2				130,620	52,950	20
110	do 23.	Mennon.	do						62					18,600	6,000	2
111	do 24.	Waudrahn	do	234					344					93,000	35,000	14
112	do 25.	Baltimore.	Liverpool	1,127					506					161,940	66,972	25
113	do 25.	Austrian.	London.	510					279					83,260	32,240	13
114	do 26.	Hamilton.	Bristol	1,493					298					111,110	45,140	20
115	do 26.	Hestia.	Glasgow						485					110,670	42,190	18
116	do 29.	Avlona.	Newcastle	272					283					88,880	33,300	12
117	do 29.	Oregon.	Liverpool	777					327					91,090	41,200	16
118	do 31.	Pomeranian.	Glasgow						581					139,120	49,000	25
Totals for July				16,182					13,851					3,926,354	1,571,262	632
Reported 30th June, 1893.				16,055	50				29,090					7,778,283	2,962,630	1,278
Total to date, 1894.				32,237					42,941					11,704,637	4,533,892	1,910
Corresponding period for 1893				657					45,753							
do 1892				12,783					54,591							

LIVE STOCK SHIPMENT.

145

119	Aug.	2.	Lake Superior.	Liverpool.	135.	509.	16 62	6	122,617	47,140	22
120	do	2.	Rosarian.	London	1,109	173	16 28	50	27,850	31,450	14
121	do	3.	Storn King.	do		84	2 52		27,380	7,670	3
122	do	3.	Warwick.	Bristol		+303	9 09		79,430	27,480	12
123	do	4.	Mongolian	Liverpool		333	9 99		97,430		14
124	do	5.	Gerona	London		312	9 36	20	86,660	33,800	13
125	do	5.	Barrowmore.	Liverpool	1,474	480	29 14	10	156,910	67,010	27
126	do	5.	Merrinac	London	647		6 47		18,000	11,220	3
127	do	5.	Sarnia.	Liverpool	686	216	13 34		66,200	27,820	13
128	do	5.	Memphis.	Bristol	531	203	14 30	4	76,220	33,000	14
129	do	8.	Lake Winnipeg.	Liverpool	630	400	18 30		106,710	44,190	19
130	do	8.	Stubbenhuk.	London	368	26	4 46	16	23,190	9,730	3
131	do	9.	Buenos Ayrean.	Glasgow.		433	12 09	81	103,720	39,100	18
132	do	9.	Tritonia	do	360	403	18 39	59	123,070	52,300	22
133	do	12.	Brazilian	London	1,802	259	25 79	10	94,790	50,190	20
134	do	12.	Fremosa.	do		258	7 74		63,450	23,420	11
135	do	11.	Laurentian	Liverpool		+581	17 43		173,130		25
136	do	15.	Lake Huron.	do	1,165	317	21 16	22	106,797	49,380	20
137	do	15.	Parkmore.	do	2,184	465	35 79		155,830	39,730	28
138	do	16.	Indrani	Glasgow	911	412	21 47	11	119,020	38,900	21
139	do	17.	Concordia.	Bristol	651	140	10 71		73,950	21,580	8
140	do	18.	Mexico	do	986	205	16 01		79,570	33,000	13
141	do	19.	Mariposa	Liverpool	1,306	117	16 57		66,862	23,350	10
142	do	21.	Pickthuben.	Antwerp		401	12 03		122,000	50,000	16
143	do	21.	Sarnatian	Glasgow	1,250	576	17 28	130	132,600	51,940	23
144	do	21.	Montevidean	London		271	29 63		113,090	20,740	17
145	do	22.	Lake Ontario.	Liverpool	360	363	14 49	42	89,560	39,670	17
146	do	23.	Escalona.	New Castle.		358	10 74		92,360	30,430	14
147	do	23.	State of Georgia.	London	595	214	12 37		94,000	21,100	11
148	do	23.	Toronto	Bristol	835	318	17 89		94,530	41,870	17
149	do	25.	Numidean.	Liverpool		518	15 54	2	116,500	40,000	22
150	do	26.	Hurona	London	2,413	394	33 25	21	152,090	65,030	23
151	do	26.	Baltimore.	Liverpool	1,234	641	31 57		191,100	70,500	33
152	do	30.	Dominion	Bristol	1,222	301	23 95		131,750	48,000	21
153	do	30.	Austrian	London	1,655	142	20 81	45	99,000	30,000	13
154	do	30.	Assyrian	Glasgow	531	576	22 59	19	142,900	51,570	26
155	do	30.	Hestia	do	1,986	340	30 06	89	154,540	86,480	23
156	do	31.	Aleides.	Bristol	1,714	169	22 21		89,550	29,680	13
		August totals.			28,740	12,301	659 13	646	3,898,706	1,387,230	640
		Total reported, July 31.			32,237	42,941	29 1,611 28	2,528 6	11,704,637	4,533,892	1,910
		Total for 1894.			60,977	55,332	2,270 41	3,174 6	15,603,343	5,921,122	2,550
		Corresponding period, 1893.			712	60,836	48 1,593 05	1,123			
		do 1892.			15,703	74,612	166 1,492 24	1,323			

*All fat cattle shipped this season.

†North-west cattle.

‡North-west cattle. No grain used.

RECORD of Live Stock shipped from Port of Montreal during 1894—Continued.

Number.	Date.	Steamer.	Destination.	SHEEP.		*CATTLE.				Fees Collected.	HORSES.		SWINE.		Hay for feed.	Grain for feed.	Number of Men.	
				Shipped.	Lost.	Fat.	Stockers.	Total.	Lost.		Shipped.	Lost.	Shipped.	Lost.				
1893.																		
157	Sept. 2	Oregon	Liverpool	540				346		15 78					92,610	38,680	16	
158	do 2	+Etolia.	London.	1,172	120			274		19 94					100,800	37,230	17	
159	do 4	Iona.	do	2,603	32			587		43 64					219,750	93,450	37	
160	do 5	Lake Superior	Liverpool					589		17 67					171,620	7,280	23	
161	do 5	Baumwall.	Antwerp					413		12 39					124,750	52,000	17	
162	do 6	+Hamilton.	Bristol	1,535	29			313	1	24 74					130,520	45,480	18	
163	do 6	Pomeranian.	Glasgow.					704		21 12					173,190	62,610	29	
164	do 7	Amarynthia.	do	844				350	1	18 94					110,500	36,000	17	
165	do 7	Barrowmore	Liverpool	900	5			625	1	27 75					196,710	82,850	32	
166	do 8	Rosarian.	London.	162				366		12 60					108,620	28,840	16	
167	do 8	Mongolian.	Liverpool					485		14 55					121,250	40,000	19	
168	do 9	Sarnia.	do	761				337	1	17 72					102,925	36,410	17	
169	do 11	Tritonia.	Glasgow	1,063				539		27 40					179,250	39,000	26	
170	do 12	Lake Winnipeg	Liverpool	494				521		20 57					102,925	36,410	22	
171	do 13	Memphis.	Bristol	1,869	5			325		28 44					129,060	64,430	21	
172	do 13	Buenos Ayrean	Glasgow	46				522		16 12		38	1		128,460	44,500	21	
173	do 14	Warwick.	Bristol	1,595	9			16		16 43					46,200	17,000	7	
174	do 15	Laurentian.	Liverpool					629		18 87					170,000	20,000	25	
175	do 15	Bruxelles.	St. Malo.					400		12 00					124,756	48,000	16	
176	do 15	Waudrahn.	London.	973	5			264		17 65					91,878	37,410	15	
177	do 15	Parkmore.	Liverpool	629				420		18 89					121,180	44,940	19	
178	do 18	Gerona.	London.	2,422				426		36 97		57			204,040	87,200	27	
179	do 19	Lake Huron	Liverpool	1,149	7			464		25 41		22			149,585	42,388	25	
180	do 20	Indrani	Glasgow	1,280				351		23 33		38			110,000	35,000	19	
181	do 20	Mexico.	Bristol	1,559				144		19 91					81,610	40,870	13	
182	do 21	Hibernian	Glasgow					320		9 60		74			81,980	28,060	12	
183	do 21	Brazilian.	London.	198				443		15 27		36			146,700	3,060	19	
184	do 23	Mariposa.	Liverpool	1,834				72		20 50					64,500	33,300	12	
185	do 25	Fremont.	London.	2,243				135		26 48		59			118,067	58,020	15	
186	do 26	Lake Ontario.	Liverpool	367				465		17 62		22			120,180	15,950	21	
187	do 26	Stubbenhuk.	Antwerp					404		12 12					139,830	52,010	16	
188	do 27	Baltimore.	Liverpool	1,073				540		15 93					180,000	61,000	26	
189	do 27	Sarnatian.	Glasgow.	445				374		15 67		159			100,920	39,530	17	
190	do 27	Toronto.	Bristol	844				320		18 06					102,050	30,210	17	

191 do	20. Montevideoan.....	London.....	435	13 05	39	128,910	17
192 do	20. Nunidun.....	Liverpool.....	520	15 50	.....	159,510	22
193 do	20. Concordia.....	Bristol.....	91	13 95	.....	58,710	9
	Totals September.....		14,548	733 70	914	4,702,336	717
	Reported 31st Aug.		55,332	39 2,270 41	3,174 7	15,003,343	2,552
	Total to date.....		69,880	3,004 11	3,988	20,305,679	3,269
	Same date 1893.....		70,541	1,886 13	1,310	.....	.....
	do 1892.....		86,877	1,737 54	1,508	.....	.....
			15,917			.....	.....

* All fat cattle shipped this season. † Struck by a gale; deck was swept; stock and fittings all carried away; ship nearly lost. ‡ Went aground at Contre-à-Cœur and was five days discharging and reloading, which is cause of loss of sheep.

194 Oct.	4. Storm King.....	London.....	842	3	.....	24,000	3
195 do	4. State of Georgia.....	Newcastle.....	593	0	.....	84,000	11
196 do	4. Dominion.....	Bristol.....	1,380	9	.....	128,180	18
197 do	4. Assyrian.....	Glasgow.....	195	1	.....	20,950	12
198 do	4. Hecla.....	do.....	206	3	.....	10,450	12
199 do	5. Anvers.....	St. Malo.....	.....	.....	.....	84,760	14
200 do	5. Huron.....	London.....	2,237	7	.....	106,930	14
201 do	6. Austrian.....	do.....	.....	.....	.....	120,000	17
202 do	7. Oregon.....	Liverpool.....	920	6	.....	102,735	12
203 do	10. Lake Superior.....	do.....	1,274	0	.....	99,380	13
204 do	10. Alcides.....	Bristol.....	738	9	.....	28,790	6
205 do	11. Sheinhoff.....	Antwerp.....	.....	.....	.....	76,920	11
206 do	11. Iona.....	London.....	2,319	11	.....	59,600	9
207 do	11. Barrowmore.....	Liverpool.....	1,048	.....	.....	180,120	15
208 do	11. Annapolis.....	Glasgow.....	426	1	.....	91,960	24
209 do	13. Mongolian.....	Liverpool.....	.....	.....	.....	207,950	28
210 do	13. Paternian.....	Glasgow.....	457	4	.....	84,792	14
211 do	14. Sarnia.....	Liverpool.....	850	1	.....	120,384	16
212 do	14. Rosarian.....	London.....	1,630	15	.....	74,500	12
213 do	17. Lake Winnipeg.....	Liverpool.....	760	0	.....	67,690	11
214 do	17. Tritonia.....	Glasgow.....	799	1	.....	114,970	18
215 do	17. Pacific Ayren.....	do.....	868	2	.....	130,450	18
216 do	18. Hamilton.....	Bristol.....	1,970	7	.....	64,729	11
217 do	21. Draconia.....	London.....	.....	.....	.....	125,390	16
218 do	24. Lake Huron.....	Liverpool.....	926	24	.....	119,570	19
219 do	24. Hibernian.....	do.....	112	.....	.....	60,370	7
220 do	24. Nosterian.....	Glasgow.....	.....	.....	.....	112,675	13
221 do	25. Memphis.....	Bristol.....	1,894	.....	.....	122,140	16
222 do	25. Indrini.....	Glasgow.....	.....	.....	.....	66,730	10
223 do	26. Warwick.....	Bristol.....	1,776	.....	.....	119,160	17
224 do	27. Laurentian.....	Liverpool.....	2,198	.....	.....	121,750	17
225 do	28. Benazilian.....	London.....	1,075	.....	.....	105,330	17
226 do	28. Mariposa.....	Liverpool.....	388	.....	.....	93,185	12
227 do	31. Lake Ontario.....	do.....	.....	.....	.....	116,760	19
			.....	.....	.....	62,500	10
			.....	.....	.....	53,639	12

RECORD of Live Stock shipped from Port of Montreal during 1894—Continued.

Number.	Date.	Steamer.	Destination.	SHEEP.			* CATTLE.			HORSES.		SWINE.		Hay for Feed.	Grain for Feed.	Number of Men.
				Shipped.	Lost.	Fat.	Stocks.	Total.	Loss.	Shipped.	Lost.	Shipped.	Lost.			
228	Oct. 30.	Etolia	London	687				181	12 30					76,500	18,500	10
229	do 31.	Sarnatian	Glasgow					336	10 08	137				92,400	16,800	14
		For the month.		28,638	*80			9,510	571 68	1,107				3,530,930	694,462	504
		Total to Sept. 30th.		90,703	668			69,880	69 3,004 11	3,988				20,305,679	7,378,350	3,269
		Total to date.		119,341	748			79,390	82 3,575 79	5,095				23,836,609	8,072,812	3,773
		Same period, 1893.		1,781				80,495	141 2,193 51	1,516						3,254
		do 1892.		15,914				95,192	608 1,903 84	1,628						3,863

* Far as heard from.

230	Nov. 2.	Gerona	London	2559	6			160	27 39	44				125,400	53,940	17
231	Nov. 3.	Mexico	Bristol	1,777	17			130	21 67					90,000	27,000	13
232	Nov. 3.	Baltimore	Liverpool	762	1			586	23 10	55				175,710	51,770	30
233	Nov. 4.	Nunidian	do					387	11 61					117,170		16
234	Nov. 4.	Montevideo	London	1,362				332	23 58					140,500	17,980	20
235	do 7.	Assyrian	Glasgow	195				217	8 46	69				62,250	21,530	9
236	do 8.	Hispania	Antwerp					354	10 62	16				100,000		14
237	do 9.	Toronto	Liverpool	419				369	15 26					110,700	18,000	16
238	do 10.	Fremona	London	1,740				238	24 54					117,340	42,760	16
239	do 11.	Concordia	Bristol	1,547				192	21 24					66,130	33,790	13
240	Nov. 12.	Oregon	Liverpool					245	7 35	19				73,500		9
241	Nov. 14.	Austrian	London	360				360	10 80					102,220	6,880	14
242	Nov. 15.	Pomeranian	Glasgow					270	8 10	136				84,830	23,920	10
243	Nov. 15.	Anarynthia	do					274	8 22					93,750	23,770	12
244	do 16.	Hurona	London	2,000				321	29 68	21				132,750	42,000	21
245	Nov. 17.	State of Georgia	do	1,380				140	18 00					84,000	25,400	11
246	Nov. 17.	Stella	Antwerp					400	12 00	22				135,690	34,100	16
247	do 18.	Mongolian	Liverpool					300	9 00					81,950	13,110	12
248	.....	Bruxelles	Ant.werp.					400	12 00					170,000	32,000	16

PICROU, N.S., 12th January, 1895.

SIR,—In reply to your letter of the 7th instant, I beg to state that 1,206 sheep were shipped from this port on the 13th December, 1894, for Glasgow, G. B., per SS. "Hestia."

I have the honour to be, sir,

Your obedient servant.

D. McDONALD,

Collector of Customs.

STATEMENT of cattle, &c., shipped at Halifax, N.S., for the United Kingdom during the month of December, 1894, showing number, dates of shipment, names of vessels and amount of fees received.

Date.	Name of Vessel.	Number of Cattle.	Number of Sheep.
1894.			
Dec. 15.....	SS. "Sarnia".....	97	None.
do 22.....	SS. "Numidian".....	165	do

DAVID HUNTER,

Port Warden.

APPENDIX No. 7.

STATEMENT relating to the Wharfs under the control of the Department on 30th June, 1894.

(Rules established for the government of wharfs, 12th June, 1889.)

Locality.	Wharfinger.	Date of Appointment of Wharfinger.	Remuneration Allowed.	Amount deposited to credit of Receiver General.
<i>Ontario.</i>				\$ cts
Cockburn Island.....	Alfred Monck.....	Apl. 16, 1894.	25 p.c. of collections.....	28 04
Goderich.....	Wm. Mariton.....	Feb. 14, 1894.	25 do not to exceed \$200 per annum.	203 33
Kingsville.....	S. A. King.....	May 5, 1890.	25 p.c. of collections.....	75 00
Morpeth.....	Thos. McCallum.....	Aug. 25, 1891.	25 do.....	38 33
Rondeau.....	W. R. Fellows.....	Dec. 17, 1888.	25 do.....	35 05
Sault Ste. Marie.....	W. H. Plummer.....	Jan. 2, 1890.	\$100 per annum.....	759 92
Southampton.....	James Johns.....	Oct. 31, 1892.	25 p.c. of collections.....	
Summerstown.....	Vacant.....	June 4, 1891.	25 do.....	
Warton.....	H. R. A. Ely.....	Dec. 10, 1890.	25 do.....	70 99
<i>Quebec.</i>				
Agnes.....	L. A. Roy.....	Nov. 27, 1891.	25 p.c. of collections.....	
Anse St. Jean.....	J. Desgagné.....	June 10, 1893.	25 do.....	105 13
Baie St. Paul.....	Vacant.....	Aug. 25, 1891.	25 do.....	
Baie St. Paul, Isolated Bl'k.	A. Simard.....	Aug. 25, 1891.	25 do.....	254 72
Beauport.....	Felix Guillot.....	Nov. 21, 1891.	25 do.....	35 00
Berthier.....	Vacant.....		25 do.....	
Carleton.....	Jos. Cauchon.....	June 4, 1889.	\$50 per annum.....	64 70
Cascades.....	Nérée Moreau.....	Oct. 26, 1892.	25 p.c. of collections.....	
Chicoutimi.....	Juste Ouellette.....	May 2, 1893.	25 do.....	215 01
Grand River.....	John Carbery.....	Sept. 23, 1892.	25 do.....	171 62
Isle aux Grues.....	Jos. Painchaud.....	Feb. 17, 1890.	25 do.....	
Lacolle.....	R. J. Robinson.....	Mar. 8, 1894.	25 do.....	
Les Eboulements.....	C. Tremblay.....	June 2, 1893.	25 do.....	176 89
L'Islet.....	Octave Morin.....	Feb. 8, 1893.	25 do.....	
Longueuil.....	D. Brisette.....	Mar. 23, 1893.	25 do.....	130 12
Megantic.....	D. J. Matheson.....	May 16, 1894.		
Murray Bay.....	Elie Maltais.....	Aug. 15, 1893.		246 32
New Carlisle.....	John C. Hall.....	June 4, 1889.	25 p.c. of collections.....	190 13
Perce.....	T. W. Flynn.....	Jan. 19, 1893.	25 do.....	104 26
Port Daniel.....	John Enright.....	Sept. 11, 1890.	\$50 per annum.....	63 49
Rivière Ouelle.....	J. H. dit Beaulieu.....	Nov. 28, 1892.	25 p.c. of collections.....	0 84
Rivière du Loup.....	Louis Pinze.....	Sept. 16, 1891.	25 do.....	260 00
St. Alphonse de Bagotville.....	Abel Tremblay.....	July 7, 1891.	25 do.....	197 02
St. Jean d'Orléans.....	Chas. Langlois.....	Dec. 16, 1892.	25 do.....	
St. Laurent d'Orléans.....	Edouard Chabot.....	Dec. 16, 1892.		
Ste. Cécile du Bic.....	L. N. Côté.....	July 20, 1891.	25 p.c. of collections.....	
Tadoussac.....	A. Christiansen.....	July 7, 1891.	25 do.....	108 29
Trois Pistoles.....	Nap Rioux.....	Sept. 16, 1891.	25 do.....	
St. Thomas de Montmagny.....	Eug. Hamond.....	May 20, 1892.	25 do.....	
<i>Nova Scotia.</i>				
Arisaig.....	John McInnis.....	Aug. 27, 1892.	25 do.....	
Avonport.....	Robert Shaw.....	Nov. 23, 1888.	25 do.....	
Barrington.....	S. W. Crowell.....	Aug. 12, 1891.	25 do.....	175 45
Bayfield.....	Edward Randall.....	Aug. 25, 1888.	25 do.....	
Belliveau's Cove.....	St. Clair Thériau.....	Nov. 24, 1892.	25 do.....	170 08
Broad Cove, Lunenburg Co.	John Teal.....	June 12, 1893.	25 do.....	
Broad Cove Marsh, Inverness Co.	Hugh McDonald.....	Oct. 19, 1892.	25 do.....	

STATEMENT relating to Wharfs, &c.—Continued.

Locality.	Wharfinger.	Date of Appointment of Wharfinger.	Remuneration Allowed.	Amount deposited to credit of Receiver General.
<i>Nova Scotia—Concluded.</i>				8 cts.
Brooklyn.	F. T. Gardiner.	do 20, 1882.	20 p. c. of collections.	
Canada Creek.	C. E. Eaton.	Nov. 23, 1888.	25 do	
Cape Cove.	M. A. Doucette.	Dec. 7, 1891.	25 do	33 61
Centreville.	W. M. B. Dakin.	Aug. 25, 1888.	25 do	62 93
Chipman's Brook.	Jas. Misaner.	Nov. 23, 1888.	25 do	
Church Point.	Chas. F. Belliveau.	Aug. 20, 1892.	25 do	44 08
Cow Bay.	Arch. McKinnon.	April 15, 1879.	74 do	2,227 00
Cranberry Head.	Abram Thurston.	Feb. 16, 1889.	25 do	
Delap's Cove.	R. W. McCaul.	Nov. 28, 1889.	25 do	5 63
Digby.	H. B. Short.	Jan. 9, 1891.	25 do	430 55
Eagle Head.	Nathan Leslie.	do 9, 1889.	25 do	
East Bay.	Donald McInnis (Ronald's son).	April 5, 1886.	50 do	
East River, Sheet Harbour.	Malcolm McFarlane.	May 20, 1890.	25 do	
Grand Narrows, Victoria Co.		Aug. 25, 1888.	25 do	12 69
Grand Narrows, Cape Breton Co.	E. A. McNeill.	Nov. 6, 1888.	25 do	69 04
Hall's Harbour.	Sydney Roscoe.	do 23, 1888.	25 do	
Hampton.	Judson Foster.	Aug. 25, 1888.	25 do	23 53
Harbourville.	B. Morris.	June 8, 1894.	25 do	27 00
Irish Cove.	John Cash.	Sept. 17, 1892.	25 do	
Maitland, Hants Co.	C. S. Stuart.	do 5, 1888.	25 do	71 22
Maitland, Yarmouth Co.	J. W. Raymond.	April 14, 1890.	25 do	9 52
Margaretsville.	T. J. Downie.	Aug. 25, 1888.	25 do	76 13
Meteghan Cove.	H. F. Deveau.	Sept. 15, 1888.	25 do	18 13
Meteghan River.	Urbain Doucette.	Jan. 3, 1883.	20 do	90 53
Militia Point.	D. McIntosh.	Aug. 20, 1892.	25 do	
Morden.	Wm. Minnis.	Nov. 23, 1888.	25 do	
Oak Point (Kingsport).				199 50
Ogilvie.	Martin Donnellan.	July 13, 1893.	25 p. c. of collections.	
Parishboro'.	Thompson Tipping.	Nov. 26, 1888.	25 do	62 23
Pickett's Wharf.	Andrew Bishop.	Dec. 24, 1884.	25 do	109 59
Plympton.	Wm. K. Smith.	Aug. 8, 1890.	25 do	
Point Brûlé.	David Stevenson.	Nov. 23, 1888.	25 do	
Port George.	W. Crawford.	June 7, 1894.	25 do	43 23
Port Greville.	Geo. Hatfield.	Feb. 17, 1893.	25 do	
Port Hood.	V. A. McDougald.	May 17, 1892.	25 do	142 43
Port Lorne.	Samuel Beardsley.	Aug. 25, 1888.	25 do	42 70
Salmon River.	J. M. Deveau.	Nov. 25, 1890.	25 do	
Saulniersville.	John T. Saulnier.	Aug. 25, 1888.	25 do	30 28
Tancook Island.	Amos Hubler.	Feb. 28, 1893.	25 do	
Tracadie.	J. M. Hall.	Nov. 6, 1888.	25 do	
Tusket Wedge.	Jas. Cothreau.	Feb. 16, 1889.	25 do	
Victoria.	William Brown.	do 11, 1889.	25 do	4 24
Wallace.	Don McKenzie.	Dec. 16, 1892.	25 do	
West Pubnico.	N. A. D'Entremont.	April 9, 1890.	25 do	
West River, Sheet Harbour.	Malcolm McFarlane.	Sept. 3, 1889.	25 do	10 24
White Point.	Elisha West.	Jan. 9, 1889.	25 do	
<i>New Brunswick.</i>				
Buctouche.	J. J. LeBlanc.	May 2, 1892.	25 do	6 82
Campbellton.	Alfred J. Venner.	June 10, 1893.	25 do	98 03
Cape Tormentine.	Wm. B. Welsh.	April 28, 1894.	25 do	76 26
Clifton, Stonehaven.	J. W. Dealey.	May 13, 1893.	25 do	
Dalhousie.	W. J. Smith.	June 27, 1891.	25 do	291 63
Hopewell Cape.	Wm. Hamilton.	April 9, 1890.	25 do	39 03
Quaco.	W. H. Rourke.	July 15, 1892.	25 do	
St. Louis.	E. Comeau.	May 2, 1893.	25 do	
<i>Prince Edward Island.</i>				
Annandale.	James Taylor.	July 2, 1885.	25 do	58 89
Bay View.	Joseph Harrington.	Oct. 2, 1885.	25 do	9 42

STATEMENT relating to Wharfs, &c.—Continued.

Locality.	Wharfinger.	Date of Appointment of Wharfinger.	Remuneration Allowed.	Amount deposited to credit of Receiver General.
<i>P. E. Island—Concluded.</i>				\$ cts.
Belfast.....	Thos. McLennan.....	July 21, 1890.	25 p. c. of collections.....	81 92
Brush Wharf.....	Levi R. Ings.....	Sept. 18, 1885.	25 do	115 37
Campbell's Cove.....	Angus McIntyre.....	Oct. 17, 1888.	25 do	
Chapel Point.....	Ronald McCormack.....	Sept. 18, 1885.	25 do	20 66
China Point.....	W. S. N. Crane.....	do 18, 1885.	25 do	28 88
Clifton.....	Wm. McKay.....	do 22, 1886.	25 do	8 09
Crapaud and Victoria Pier.	James Day.....	May 12, 1890.	25 do	102 49
Georgetown.....	James Bourke.....	July 2, 1885.	25 do	20 33
Hickey's Wharf.....	R. Webster.....	do 31, 1891.	25 do	4 50
Higgin's Shore.....	G. G. Henry.....	Nov. 9, 1891.	25 do	
Hurd's Point.....	R. Robblee.....	Oct. 6, 1888.	25 do	37 73
Kier's Shore.....	James Crowley.....	April 28, 1894.	25 do	57 11
Lambert.....	Angus McQueen.....	Oct. 24, 1891.	25 do	
Lewis Point.....	Jos. A. Macdonald.....	April 15, 1891.	25 do	51 75
McGee's Island.....	Norman Gallant.....	Nov. 9, 1891.	25 do	
Mink River.....	B. Clow.....	June 30, 1891.	25 do	
Murray Harbour, South.....	R. Murley.....	Aug. 25, 1891.	25 do	18 40
Nine Mile Creek.....	Edward Harrington.....	Oct. 29, 1885.	25 do	
North Cardigan.....	Donald McIntyre.....	July 2, 1885.	25 do	34 08
Pinette.....	Vacant.....		25 do	
Pownal.....	Alex. McRae.....	Oct. 2, 1885.	25 do	32 16
St. Mary's Bay.....	C. H. Lewellin.....	July 2, 1885.	25 do	22 00
Souris.....	B. McEachern.....	June 3, 1884.	25 do	
South Rustico, Oyster Bed				
Bridge.....	Joseph Doucette.....	Oct. 2, 1885.	25 do	36 00
Stevens and Montague.....	Angus McQueen.....	do 24, 1891.	25 do	89 06
Sturgeon River.....	Bernard Kearney.....	Sept. 18, 1885.	25 do	36 00
Tignish River.....	Geo. Conroy.....	Oct. 2, 1891.	25 do	113 03
Vernon River.....	J. G. McKenzie.....	do 19, 1885.	25 do	89 47
Wood Island.....	M. H. McMillan.....	May 16, 1889.	25 do	

RECAPITULATION.

	\$ cts.
Ontario.....	1,210 66
Quebec.....	2,323 54
Nova Scotia.....	4,191 56
New Brunswick.....	511 77
Prince Edward Island.....	1,057 31

Total wharfage dues collected..... 9,294 84

ADD—Fees received by undermentioned harbour masters in excess of remuneration allowed :—

Harbour Masters—Fort William, Ont.....	\$ 20 00
do Port Arthur, Ont.....	2 50
do St. Johns, Que.....	47 00
do Cape Canso, N.S.....	
do International Pier, N.S.....	
do South Bar, N.S.....	
do Yarmouth, N.S.....	
do Chatham, N.B.....	14 00
do Nanaimo, B.C.....	15 00
do Vancouver, B.C.....	60 50
	159 00

Total Revenue from Wharfs and Harbours..... 9,453 84

This statement only shows amounts received by department and placed to credit of Receiver General up to 30th June, 1894.

APPENDIX No. 8.

SIGNAL SERVICE, CANADA.

OFFICE OF THE SUPERINTENDENT, QUEBEC, 17th Nov., 1894.

The Deputy Minister,
Marine and Fisheries,
Ottawa.

SIR,—I have the honor to inclose herewith annual report and Appendices A, B, and C for the fiscal year ending 30th June, 1894.

I have the honour to be sir,

Your most obdt. servant.

H. J. McHUGH.

QUEBEC, 17th November, 1894.

To the Deputy Minister
of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit the following report as to the service for the year ending June 30th, 1894.

As in preceding seasons, reports have been received from the stations in the lower part of the river and gulf, recording the weather, wind condition, location and movement of the ice during the winter and spring months, and during the season of navigation all inward and outward vessels as signalled and seen from the stations.

The winter of 1893-94 was as remarkable for the immense and early fall of snow and formation of ice, as the two previous winters were free from the first and the late making of the ice. Ice formed rapidly and closed all harbours that in the past winter of 1892-93 remained open.

Ice was met by incoming steamers outside the gulf and inside and extending to 100 miles west of Bird Rocks and north in the direction of St. Mary's Island to the Labrador coast, as will be seen by Appendix A. The west coast of Newfoundland and extending through the Straits of Bellefisle was closed with packed ice which remained all-winter.

The Gut of Canso was closed 9th January and opened 28th April. In 1893, it was closed 8th January and clear of ice on the 22nd April.

Pleasant Bay or Harbour, Magdalen Islands, was open for navigation on the 27th April.

Sydney Harbour, that was navigable all the winter of 1892-93, closed on the 2nd February and only opened on the 26th April.

Port Mulgrave, Gut, of Canso reported the condition of ice in the gut as in the past two seasons to Halifax N. S., Pictou, N. S., and Charlottetown, P.E. I. until navigation was closed.

Grosse Isle Quarantine station, reported as in 1892 all trans-atlantic vessels when given pratique, and has proved very satisfactory to the shipping interests. These reports are free to the department being transmitted over the government telegraph line to Quebec.

From the 1st to the 20th April three reports per week were obtained and forwarded to the Boards of Trade, Montreal, St. John, N. B., and Quebec, and to the chamber of commerce, Halifax, N. S.; also to the press of Montreal and Quebec, to the agent of the department, Quebec, to the custom house and immigration agent, to agents of steamship lines, tug owners, to the pilots for below and above Quebec, also to Messrs. H. Fry & Co., Lloyds agents, Quebec.

From the 21st April his reports were received daily as above and in addition the news room, North Sydney, is also supplied with the reports during the season of navigation.

The quarantine doctor at Rimouski is also supplied with a report of the incoming mail steamers, name of station and hour of passing being given when vessel first signalled.

The chief superintendent of the quarantine service at Grosse Isle is also supplied with full information as to weather, wind and the incoming of all trans-atlantic or foreign vessels.

Information as to the wind, weather and ice in the vicinity of Anticosti, Magdalen Islands, Meat Cove, C. B., St. Paul's Island, Cape Ray, Newfoundland, is also sent to Point aux Esquimaux in March for the guidance of the sealing fleet.

This is the fourth season that no ice has been seen in the vicinity of St. Pierre Miquelon after the middle of April.

Full information was supplied from the bureau here as in past seasons to the agents at Anticosti, Magdalen Islands, Meat Cove, C. B., Cape Ray, Newfoundland; Low Point, North Sydney, from the 18th April and to Cape Race, Newfoundland; from the 13th April, as to the weather, wind, movement and condition of the ice in the gulf and River St. Lawrence up to Montreal for the guidance of any vessel calling for information.

NAVIGATION.

March 4th.—St. Paul's Island, clear, calm, heavy close packed ice everywhere Inwards this a. m. ss. "Algerine".

March 19th.—Two schooners arrived at Rimouski wharf from Bersimis, proceeded and arrived at Quebec on the 21st March.

March 25th.—Schooner "Salmon Queen" arrived from Malbaie.

April 14th.—Ss. "Constance" left Quebec for below.

April 17th.—Pilot cutter No. 1 left for her station. Tugs "Florence," "C. W. Jones" and "Relief" out for the season. Schooner "Chauveau" from Pentecost reported in off Manicouagan.

April 18th.—Ss. "Polino" cleared for St. Johns, Newfoundland.

April 19th.—St. Paul's Island reports a two masted steamer in.

April 20th.—Tug "Challenger" with quarantine staff left for Grosse Isle.

April 23rd.—Ss. "Premier" from the West Indies with fruit for Montreal due in that port had proceeded up the gulf to within twenty miles of the Bird Rocks, met heavy field ice extending as far seen in all directions, coasted along its eastern edge, passed Heath Point as far Meccatina and Labrador Coast, but could get no passage and had to retrace her course, and finally made for Halifax, N. S., where she arrived on the above date.

1893.—Last outward mail steamer, November 20, ss. "Vancouver," for Liverpool.

1893.—Last outward steamer, November 24, "State of Alabama," for Great Britain, and ss. Louisburg for Sydney, C. B.

1893.—Last inward steamer, November 30, ss. "Polino," Captain Lachance, from Newfoundland. December 5, ss. "Constance" from below, met considerable ice.

1894.—First inland bound trans-atlantic vessel, April 25, ss. "Phoenix," Captain Pick, from Messina for Montreal, reports met ice 25 miles west of Cape Ray, which continued heavy to Anticosti, April 22, completely surrounded by it. April 23, found an open track and proceeded through it for 100 miles, and made Point des Monts, thence to Quebec without seeing any more.

1894.—First mail steamer, May 1, ss. "Sardinian," Captain Moore, from Liverpool, April 19, arrived.

1894.—First trans-Atlantic sailing vessel, May 8, "Ship Hooding," Captain Larsen, from Moss, Norway, April 7, arrived. The first vessel in, in 1893, was on May 5.

REPORTS FROM CAPTAINS.

May 1, arrived ss. "Lake Ontario," from Liverpool, April 2, passed large field ice off Bird Rocks. None elsewhere.

May 1, ss. "Dominion," Captain Cross, from Bristol, met 13 bergs east of Cape Race and patches of field ice from 25 miles east of the Cape to 10 miles west of it. When 25 miles N.N.W. of the Bird Rocks passed through about 20 miles of field ice.

May 1, ss. "Pickhuben," Captain Splerdt, from Hamburg, April 18, passed Cape Ray in a snowstorm, large quantities of field ice off Bird Rocks, passed through it for 100 miles to the westward.

May 2, ss. "Toronto" from Liverpool, April 19, met icebergs east of Cape Race, later passed through 20 miles heavy close-packed ice off Bird Rocks.

SEALING.

A new venture in this line has been made by a Halifax firm, having purchased the ss. "Newfoundland," which proceeded from that port March 1, and passed Cape North, C. B., bound for the sealing grounds.

March 13, 14 schooners with an average crew of 10 men each, left Point Aux Esquimaux for the Gulf and Straits of Belle Isle, and returned, made the following fares:—

Schooner "Eugenie," 800 large seals.

- " "Emilia," 630
- " "Labrador," none.
- " "H.B." 820.
- " "Java," none.
- " "Acara," none.
- " "Stella Marie," 150.
- " "Ste. Anne," 800.
- " "Phoenix," 12.
- " "Gleaner," none.
- " "Pioneer," none.
- " "D. Cronan," 750.
- " "C. M. G. P.," 15.
- " "Marguerite," none.

Ten schooners left the Magdalen Islands with an average crew of 12 men each and returned with fares as under.

Schooner "Wilhome."

- " "Albert."
- " "Marie Enesie."
- " "Richard B."
- " "Goldhunter."
- " "Lion."
- " "Canadian," 1,000.
- " "Lady Adele," 1,000.
- " "Mary Jane."
- " "Mary Joseph."

The two following schooners sold their fares at the Magdalen Islands.

Schooner "Evelyn," 800 large seals.

" "Una," 1,100.

March 26th 200 killed at Grosse Isle, Magdalen Islands.

April 2nd, ss. "Panther" at Cape Ray, Newfoundland, with 22,000.

April 7th, St. Pauls Island, a flock of old harps off here.

April 7th, 5,500 young harps killed at Bryon Island.

April 10th, 200 killed in Necil's harbour, Magdalen Islands.

Respectfully submitted,

H. J. McHUGH,

Inspector Signal Service.

APPENDIX A.

Report on ice, &c., in the Straits of Belle Isle and west coast of Newfoundland as noted by the Agents of the Department at Belle Isle, Cape Bauld, Cape Norman, Forteau, Greenly Island and Point Rich, Newfoundland, from July, 1893 to June, 1894.

BELLE ISLE.

Dec. 3rd, first appearance of slob ice. In 1892 the first ice noticed on Dec. 23rd.

The last outwards bound was sighted on the 12th November. In 1892 it was on the 22nd November. A steamer was sighted on the 26th bound south supposed a collier from Green Bay mines bound to Sydney. No snow or cold weather in November. Winter may be said to have set in on 13th December at once; ice making constantly in calm water during the whole month with E.S.E. gales keeping the ice broken up. No difficulty to pass through. Some heavy gales occurred in the latter part of the month, reaching from 50 to 70 miles hourly by anemometer.

No icebergs were seen in November or December. A good deal of fog and very little snow; of the latter, the first fell on the 28th December.

January.—Quite a lot of ice formed during this month in the straits and to the north, but owing to a heavy swell setting in from E. S.E., nearly all the month kept it broken up, making it feasible for vessels to pass through.

Very little fog compared to other years. I noticed it on the 9th, 11th and 13th only. No icebergs seen this month.

February.—This month has been cold and stormy with frequent snowfalls. On the 7th, 8th and 9th snow fell and made drifts 20 feet deep. Ice made during all the month, and kept driving out to the east all the time. Up to the 23rd instant, vessels could have passed by either north or south shore as the winds suited. A slight roller was noticed several times but as the sheet ice was large and strong it did not have any effect in breaking it up. No northern ice or snow drove out during the month. Owing to the cold weather it has not broken up.

A few schools of breeding seals going north were seen on the 28th and 29th.

March.—First half of month was mild and fine. Ice scattered in the straits and drifting out to sea, numerous lakes amongst it, making it easy for properly fitted vessels to pass through. After the 14th the weather set in cold and stormy, and remained so until the end of the month. First day of spring 23rd, thermometer marked 5° below zero. Young seals were numerous on the 13th and 14th, but drove off south, north gales prevailing. No sealing schooners seen as in other years. No icebergs.

April.—During the first part of the month, the straits were pretty clear of ice except along the south shore. On the 7th a large pan drove into the straits blocking it entirely. A number of bergs, some of immense size, outside driving to the south—a number of small ones drove into the straits. The straits remained blocked during the whole month. On the 2nd a gulf sealing steamer came down from the west and went south-east. On the 13th a steamer drove into the straits fast in the pan and tried to force out to the south but could not. On the 22nd two steamers of the northern fleet came to the edge of the ice, distant about 10 miles, but could not come in. Snow fell on the 21st only.

May.—This month was stormy, S.E. to N. winds prevailing, keeping the straits blocked with heavy ice which remained stationary during the latter part of the month. Water could be seen over the ice but did not work in as the ice was jammed above to the westward. No vessels, seals or any living thing was seen during this month. Neither ducks, bunting or other birds, usual at this season of the year, came to the island. Ice-fog prevailed about every other day.

June.—First part a repetition of May weather, but with more fog and some rain with heavy thunder and lightning on the 23rd. A snow storm on the 12th. The wind veered to the west and scattered the ice to the south where it remained blocked.

June 12th.—S. S. "———," Captain Clanford, arrived, usually reaches here the 25th May.

June 13th.—Commodore Curzon of H. M. S. "Cleopatra," came on shore to see from the town if he could get his ship out of the ice. This vessel got fast in the ice off Port Rich, Newfoundland, drove down to there, the vessel was in dangerous positions at times. Reports were supplied the Commodore, and the clear track shown him : having proceeded the vessel was steered S.-E. and got clear.

June 18th.—Schooner "Beulah," Captain Thomas Gunn, from Green Bay, arrived at fishing station, at Lark Islet harbour, reports left Green Bay May 18th, found the shore packed with ice. The mail steamer was blocked at Cape John for two weeks, a lot of scattered and close fields of ice south of Cape Bauld. Also reports 100,000 seals killed on shore at Green Bay.

June 27th.—Squally with fog. One Dominion line and another steamer passed west, and 40 fishing schooners passed north.

June 29th.—SS. Panther and 150 schooners passed north.

ICEBERGS.

February 1st,	2, to the eastward.	May	1st, 126,	south and S. E.
" 3rd,	3, "	"	5th, 113,	"
" 7th,	4, "	"	9th, 146,	"
" 11th,	6, "	"	12th, 142,	"
" 14th,	3, "	"	15th, 78,	"
March 1st,	10, "	"	18th, 86,	"
" 6th,	8, "	June	1st, 289,	"
" 9th,	6, "	"	4th, 368,	"
" 20th,	4, "	"	5th, 275,	"
" 24th,	10, "	"	9th, 199,	"
" 29th,	10, to the south east.	"	11th, 246,	"
April 2nd,	43, "	"	14th, 250,	"
" 5th,	40, "	"	16th, 163,	"
" 7th,	37, "	"	18th, 187,	to the S. S. E.
" 15th,	63, south and S. E.	"	20th, 129,	"
" 17th,	69, "	"	23rd, 87,	"
" 20th,	74, "	"	25th, 69,	"
" 24th,	163, "	"	27th, 113,	"
" 26th,	178, "	"	29th, 121,	"

CAPE BAULD, NFLD.

As stated in previous reports, the distance from Belle Isle being but 14 miles, the observations as to wind, weather, &c., vary but little.

No seals killed on shore, though thousands were seen on the ice.

CAPE NORMAN.

October 19th.—First fall of snow with slight frost, north wind.

December 15th.—First slob ice formed along shore. Snow fell 14 days during this month. From the 15th of this month until the 15 of June the strait remained solidly packed with ice. In that time it snowed 79 days.

March 16th.—400 young seals landed here. Thousands on the ice going west.

ICEBERGS.

1893.—August 23 seen daily (average).

" September 6 "

" October 4 "

" November 2 "

" December 2 "

1894.—May 1st to 15th 3.

" 21st, 44 to the North and East.

" 22nd, 44 "

" 23rd, 45 "

1894.—May 24th, 45 to the North and East.

" 25th, 45 "

" 26th, 36 "

" 27th, 35 "

" 28th, 40 "

" 29th, 45 "

" 30th, 83 "

" 31st, 82 "

June 1st to 31st, 64, seen daily average.

POINT AMOUR—LABRADOR COAST.

Being almost within the same limit of the strait as Cape Norman observations as to weather, wind, &c., are about similar.

March 12th.—Thousands of young and old seals on the ice though jammed moving out.

March 14th.—Sealing steamer drifting out with the ice.

March 19th.—Sealing steamer killing and taking seals off here.

April 11th.—A sealing steamer jammed in the ice moving east.

May 16th.—A few seals caught in the nets.

June 17th.—First codfish caught. Deer were fairly plentiful.

ICEBERGS.

An average of 10 daily seen from May 17th to June 30th.

GREENLY ISLAND (LABRADOR COAST).

1893, October 18th.—First snow north, north-east winds during this month.

November.—N. E. and S. E. winds with snow, sleet and rain on several days.

December 16th.—First slob ice along shore. From this date until June 13th 1894, the straits and gulf were covered with heavy close packed to open ice. Easterly winds all winter until latter end of May when wind veered to west, north and south west.

First steamer sighted on June 13th.

ICEBERGS.

1893,—July 26th, 3, 2 miles off; August 9th, 13th, 2, 3 miles off; September, 4th, and 13th, 1, 2 miles off.

POINT, RICH NFLD.

1893.—October 18th.—First appearance of snow, and frost on the 19th.

December 25th.—First slob in along shore.

1894.—January 4th to May 14th.—Heavy close packed, to open ice hugged the coast and extended as far out as could be seen. North-east to south winds with occasional westerly breezes prevailed all winter.

1894.—March 16th.—A sealing steamer in the ice, 10 miles west, off here.

Seals plentiful on the ice but the ice, is too open to venture on it.

March 29th.—Sealing steamers killing and taking in seals off here.

April 3rd 4th.—About 600 seals killed here ashore.

May 2nd.—A French brig arrived to day.

June 11th to 15th.—Some field ice 6 miles off here.

CAPE RACE, NFLD.

ICEBERGS.

April 30th.—Clear weather, north wind. 6 bergs distant and scattered, south and south east. No field ice.

May 2nd.—Clear, calm; heavy open ice inshore, 7 bergs in sight.

Respectfully submitted,

H. J. McHUGH,
Inspector Signal Service.

APPENDIX
TELEGRAPH, SEMAPHORE AND SIGNAL
RIVER AND GULF
SOUTH SHORE OF THE

Signal Stations.	Telegraph Offices.	Lighthouse.	Flag Stations.	Semaphore Station.	Marine Miles from Quebec.	Telegraph Co. Working Lines.
1 L'Islet.....	Tel. Office		Flag.....		41	Great North-western Co.
2 Rivière du Loup.....	do	Lighthouse.....	do		95	do
3 Father Point.....	do	do	do		157	do
4 Little Métis.....	do	do	do		197	do
5 Matane.....	do	do	do			do
6 Cape Chatte.....	do	do	do		230	do
7 Martin River.....	do	do	do		255	do
8 Cape Magdalen.....	do	do	do		288	do
9 Fame Point.....	do	do	do		318	do
10 Cape Rosier.....	do	do	do		339	do

NORTH SHORE OF THE

11 Port Neuf.....	Tel. Office	Lighthouse.....	Flag.....		145	Dom. Govt. and G.N.W. Co. .
12 Manicouagan.....	do		do		187	do
13 Pointe des Monts.....	do	Lighthouse.....	do		224	do

GASPE COAST

14 Cape Despair.....	Tel. Office	Lighthouse.....	Flag.....		372	Great North-western Co.
15 Pointe Maquereau....	do	do	do		394	do

COAST OF NEW

16 Point Escuminac.....	Tel. Office	Lighthouse.....	Flag.....		450	Dom. Govt. and G.N.W. Co. .
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ISLAND OF

17 West Point.....	Tel. Office	Lighthouse.....	Flag.....		328	Dom. Govt. and G.N.W. Co. .
18 South-West Point.....	do	do	do		358	do
19 South Point.....	do	do	do		408	do
20 Heath Point.....	do	do	do		428	do

MAGDALEN

21 Grosse Isle.....	Tel. Office	Lighthouse.....	Flag.....		467	D. Govt., W.U. & G.N.W. Co.
22 Amherst Island.....	do	do	do		471	do

CAPE BRETON,

23 Meat Cove	Tel. Office	Lighthouse.....	Flag.....		529	D. Govt., W.U. & G.N.W. Co.
24 Low Point.....	do	do	do ..	Semaphore.	575	do

ST. PAUL'S

25 Main Station.....	Telephone	Lighthouse.....	Flag.....		528	D. Govt., W.U. & G.N.W. Co.
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NEWFOU

26 Cape Ray.....	Tel. Office	Lighthouse.....	Flag.....		542	D. Govt., Anglo-Amer. Cable Co., W.U. & G.N.W. Co. ...
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B.

STATIONS, MARINE DEPARTMENT, CANADA.
OF ST. LAWRENCE.
RIVER ST. LAWRENCE.

Rate per ten words and additional words.	Date when established.	Name of Agent.	Post Office.	County.	Province.	Salary per annum from Marine Dept.
25c. & 1c.	Oct. 28, '79.	Mrs J. B. E. Fortin	L'Islet	L'Islet	Que.	\$50
do	Nov. 16, '81.	L. T. Piuze	Rivière du Loup (en bas)	Temiscouata	do	50
do	Nov. 22, '79.	John McWilliams	Father Point	Rimouski	do	50
do	Nov. 17, '79.	Jules Martin	Little Métis	do	do	50
do	Nov. 5, '79.	P. Desjardins	Matane	do	do	50
do	Sept. 19, '79.	Treffé Côté	Cape Chatte	Gaspé	do	50
do	Sept. 23, '79.	Jean Gauthier	Martin River	do	do	50
do	Oct. 9, '79.	J. F. Sasseville	Cape Magdalen	do	do	50
do	Oct. 14, '80.	James Ascah	Fox River	do	do	50
do	Oct. 20, '79.	E. Costin	Cape Rosier	do	do	50

RIVER ST. LAWRENCE.

40c. & 2c.	June 1, '83.	Dorelas Tremblay	Port Neuf (en bas)	Saguenay	Que.	\$50
do	Aug. 15, '83.	A. Lausier	Manicouagan	do	do	
do	Oct. 19, '83.	V. Faffard	Pointe des Monts	do	do	50

OF THE GULF.

25c & 1c.	June 17, '80.	James Beck	Cape Despair	Gaspé	Que.	\$50
do	May 22, '80.	Auguste Bertrand	Port Daniel	do	do	50

BRUNSWICK.

40c. & 2c.	July 2, '85.	K. McLennan	Point Escuminac	Northumberland	N.B.	
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ANTICOSTI.

75c. & 6c.	Oct. 1, '81.	Auguste Malouin	Anticosti Id. via Gaspé	Gaspé	Que.	
do	Oct. 18, '80.	E. Pope	do	do	do	
do	July 27, '81.	Alphonse Nadeau	do	do	do	
do	July 20, '81.	Z. Gagné	do	do	do	

ISLANDS.

\$1.00 & 8c.	Aug. 17, '80.	A. Le Bourdais	Magdalen Id. via Pictou	Gaspé	Que.	
do	June 11, '81.	William Cormier	do N.S.	do	do	

NOVA SCOTIA.

55c. & 3c.	Nov. 7, '81.	A. R. MacDonald	Meat Cove, C.B.	Victoria	N.S.	
30c. & 2c.	Aug. 1, '81.	J. G. Peters	Low Point, C.B.	Inverness	do	\$50

ISLAND.

80c. & 5c.	1890	S. C. Campbell	North Sydney, C.B.	Victoria	N.S.	
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NDLAND.

\$1.05 & 10c.	Nov. 3, '82.	E. R. Rennie	Cape Ray	Newfoundland	Nfld.	\$50
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H. J. McHUGH, *Inspector, Signal Service.*

APPENDIX C.

THERMOMETER Readings at Belle Isle from 1st December, 1893, to 30th June, 1894.

Date.	Degrees	Date.	Degrees	Date.	Degrees	Date.	Degrees
1893.		1894.		1894.		1894.	
Dec. 1.....	34	Jan. 21.....	27	Mar. 16.....	23	May 9.....	39
do 2.....	34	do 22.....	34	do 17.....	16	do 10.....	37
do 3.....	11	do 23.....	9	do 18.....	17	do 11.....	36
do 4.....	38	do 24.....	2	do 19.....	26	do 12.....	38
do 5.....	16	do 25.....	34	do 20.....	18	do 13.....	37
do 6.....	22	do 26.....	-15	do 21.....	15	do 14.....	38
do 7.....	23	do 27.....	10	do 22.....	-5	do 15.....	35
do 8.....	15	do 28.....	-1	do 23.....	-5	do 16.....	37
do 9.....	5	do 29.....	-8	do 24.....	23	do 17.....	39
do 10.....	15	do 30.....	10	do 25.....	26	do 18.....	35
do 11.....	20	do 31.....	22	do 26.....	27	do 19.....	39
do 12.....	22	Feb. 1.....	13	do 27.....	20	do 20.....	39
do 13.....	-14	do 2.....	8	do 28.....	18	do 21.....	43
do 14.....	-18	do 3.....	10	do 29.....	21	do 22.....	36
do 15.....	-6	do 4.....	-20	do 30.....	27	do 23.....	34
do 16.....	18	do 5.....	-1	do 31.....	19	do 24.....	35
do 17.....	29	do 6.....	9	April 1.....	27	do 25.....	34
do 18.....	27	do 7.....	21	do 2.....	20	do 26.....	40
do 19.....	16	do 8.....	8	do 3.....	23	do 27.....	39
do 20.....	20	do 9.....	10	do 4.....	15	do 28.....	41
do 21.....	15	do 10.....	-5	do 5.....	21	do 29.....	37
do 22.....	-7	do 11.....	12	do 6.....	23	do 30.....	38
do 23.....	10	do 12.....	-15	do 7.....	29	do 31.....	37
do 24.....	-6	do 13.....	-20	do 8.....	27	June 1.....	37
do 25.....	10	do 14.....	-15	do 9.....	29	do 2.....	35
do 26.....	-5	do 15.....	10	do 10.....	26	do 3.....	47
do 27.....	-8	do 16.....	19	do 11.....	28	do 4.....	48
do 28.....	21	do 17.....	-10	do 12.....	27	do 5.....	43
do 29.....	30	do 18.....	15	do 13.....	29	do 6.....	35
do 30.....	20	do 19.....	22	do 14.....	30	do 7.....	35
do 31.....	-10	do 20.....	24	do 15.....	29	do 8.....	32
1894.		do 21.....	-5	do 16.....	32	do 9.....	40
Jan. 1.....	15	do 22.....	10	do 17.....	29	do 10.....	39
do 2.....	-10	do 23.....	15	do 18.....	30	do 11.....	39
do 3.....	-7	do 24.....	-15	do 19.....	33	do 12.....	43
do 4.....	10	do 25.....	-21	do 20.....	31	do 13.....	46
do 5.....	12	do 26.....	-8	do 21.....	32	do 14.....	48
do 6.....	-5	do 27.....	-8	do 22.....	32	do 15.....	46
do 7.....	-9	do 28.....	-1	do 23.....	34	do 16.....	48
do 8.....	-11	Mar. 1.....	15	do 24.....	34	do 17.....	47
do 9.....	-3	do 2.....	29	do 25.....	33	do 18.....	49
do 10.....	-5	do 3.....	25	do 26.....	28	do 19.....	46
do 11.....	13	do 4.....	26	do 27.....	33	do 20.....	49
do 12.....	21	do 5.....	30	do 28.....	28	do 21.....	49
do 13.....	-20	do 6.....	32	do 29.....	22	do 22.....	47
do 14.....	25	do 7.....	34	do 30.....	33	do 23.....	43
do 15.....	27	do 8.....	26	May 1.....	34	do 24.....	41
do 16.....	24	do 9.....	23	do 2.....	35	do 25.....	47
do 17.....	-9	do 10.....	24	do 3.....	38	do 26.....	46
do 18.....	15	do 11.....	28	do 4.....	35	do 27.....	45
do 19.....	25	do 12.....	34	do 5.....	34	do 28.....	43
do 20.....	-1	do 13.....	30	do 6.....	34	do 29.....	49
		do 14.....	27	do 7.....	30	do 30.....	51
		do 15.....	29	do 8.....	33		

Lowest temperature, 1893, 14th December; highest, 4th December. Lowest temperature, 1894, 13th January; highest, 22nd and 25th January. Lowest temperature, 25th February; highest, 20th February. Lowest temperature, 22nd and 23rd March; highest, 7th and 12th March. Lowest temperature, 4th April; highest, 23rd and 24th April; Lowest temperature, 7th May; highest, 21st May. Lowest temperature, 8th June; highest, 30th, June.

The sign minus (—) before figures denotes below zero.

(Signed)

MICHAEL COLTON,
Light-Keeper
 H. J. McHUGH,
Inspector Signal Service.

Respectfully submitted,

APPENDIX No. 9.

MESSENGER PIGEONS.

THE CITADEL, HALIFAX, N.S., 26th December, 1894.

SIR,—(1) Owing to the heavy losses of birds in the 1893 training and in accordance with the recommendations of General Cameron (in his letter of 29-3-94, forwarded by the Deputy Minister, 27-4-94) hardly any training has taken place during 1894—the birds being left to breed till a sufficient number of well grown birds are ready.

(2) The numerical results are as follows :—

Birds in loft January, 1894.....	14
Presented by General Cameron.....	26
Received (in exchange) from Mr. Price.....	5
Born in loft during 1894.....	69

Total in loft during 1894.....	<u>114</u>
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The losses are as follows :—

Died young.....	15
Died of pip.....	12
Died of cramps.....	1
Lost while exercising.....	4
Transferred to Sable Island.....	2
Presented (in exchange) to Mr. Price.....	5

Total losses during 1894.....	<u>39</u>
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Leaving birds in loft, 26-12-94.....	<u>75</u>
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(3) The birds are well looked after by the pigeon caretaker, Private Weaver, of the King's Regiment, under the superintendence of Sergeant Mulholland, R. E. Private Weaver receives \$6.00 a month, but Sergeant Mulholland gives his services gratis. This latter is not a good arrangement.

Sergeant Mulholland will probably return to England in the spring, and I would urge that some remuneration be provided for the superintendent, which, if it is to be properly done, involves more work than can be expected from a volunteer—unless some payment is made it is practically impossible to fix responsibility.

(4) The provision of a permanent loft at the Citadel is under consideration, but for the spring and summer of 1895, the present hut can be made to suffice, an expenditure of \$25 having been incurred in alterations.

The experience gained in 1895 will perhaps justify further expenditure.

(5) During a recent visit to Sable Island, I borrowed from the superintendent copies of his meteorological registers for the last few years. Extracts from these have been made by Sergeant Mulholland and compared with the Halifax registers for the same days. In this way a rough approximation can be made to the number of days in the year on which pigeon communication could be made from Sable Island to Halifax. It is assumed that fog, rain, mist and strong winds from the west make communication impossible, that northerly and in a lesser degree also southerly winds are unfavourable unless light, and the east and especially southeast winds are favourable.

The results of this estimate are shown in the annexed "Table of Pigeon Days."

Taking the year 1893 only, it appears that there would have been on the average six possible pigeon days per month, of which three would have been favourable.

Too much importance should not however be attached to these figures. It is probable that by carefully choosing the time at Sable Island more opportunities would be available than can be shown by the weather registers.

I am, sir, your obedient servant,

J. PARSONS, Esq., Agent,
Marine and Fisheries Dept.
Halifax, N. S.

D. MILLS, Capt. R.E.
Superintendent of Signals.

TABLE OF PIGEON DAYS

Showing the number of days in each month from January, 1893, to August, 1894, during which pigeons might have been despatched from Sable Island with some chance of success—distinguishing between doubtful and favourable days, based on an examination of the Meteorological Registers kept at Sable Island and Halifax.

Month.	Number of Pigeon Days.		
	Doubtful.	Favourable.	Total.
1893.			
January	4	3	7
February	3	1	4
March	3	3	6
April	3	5	8
May	4	1	5
June	2	1	3
July	5	3	8
August	2	7	9
September	4	1	5
October	3	4	7
November	2	4	6
December	2	1	3
1894.			
January	2	1	3
February	3	1	4
March	2	5	7
April	0	1	1
May	1	2	3
June	2	6	8
July	0	2	2
August	3	5	8
Average	2.5	2.8	5.3

APPENDIX No. 10.

REPORT OF CHAIRMAN OF BOARD OF EXAMINERS OF
MASTERS AND MATES.

HALIFAX, N. S., 10th November, 1894.

The Deputy Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit the annual report of the proceedings of the Board of Examiners of Masters and Mates, from 30th June, 1893, to 30th June, 1894, the end of the fiscal year.

The Board met for examination, as follows:—

Port of Halifax.....	12 times.
“ St. John.....	8 “
“ Yarmouth.....	3 “
“ Quebec.....	2 “

There were also 3 examinations held at Victoria, B. C., the papers and problems being forwarded to the agent at that port and returned to Halifax for inspection and approval of the chairman of the Board.

At Halifax, 31 applications were made for foreign-going certificates of competency as master and 6 for coasting; 19 foreign-going and 5 coasting masters received certificates; 22 applications were made for foreign-going certificates of competency as mates and 1 for coasting; 12 foreign-going mates and 1 coasting received certificates.

At St. John, 9 applications were made for foreign-going certificates of competency as master and 2 for coasting: 8 foreign-going and 1 coasting master received certificates; 17 applications were made for foreign-going certificates as mate and 11 mates received certificates.

At Yarmouth, 3 applications were made for foreign-going certificates as master and 3 for coasting; 2 foreign-going candidates and 3 coasting received masters' certificates of competency; one candidate applied for a foreign-going certificate as mate and received a certificate.

At Quebec, one candidate applied for a master's certificate for foreign-going and passed, and three applied for foreign-going certificates as mate and all were successful.

At Victoria, B. C., 3 applications for masters' certificates, foreign-going, and 1 for mate were made; 2 masters and 1 mate received certificates.

Thus it will be seen that for the twelve months ending June 30th, 1894, 47 applications were made for masters' certificates of competency foreign-going and 44 for mates; 32 masters and 28 mates received certificates; 11 applications for certificates as master competency for coasting were made to the Board of Examiners and one for mate; 9 master and 1 mate obtained certificates. Forty-eight certificates of service were issued through the Halifax office for masters coasting and 15 for mates and 10 renewal certificates of all kinds.

The total number of certificates issued by the Department of Marine and Fisheries, including competency, service and renewal, upon applications made to the Board of Examiners, Halifax, was 143 and fees to the amount of \$875 were collected. The fees for the examinations at Victoria, are sent direct to Ottawa and are not accounted for by the chairman.

This report does not take into consideration coasting and inland certificates granted by the Department of Marine and Fisheries after an examination at other ports than those mentioned.

At St. John, the local member of the board holds examinations for coasting candidates and makes the returns to the department.

Amongst the applications above enumerated some candidates have presented themselves a second, third and even fourth time for examination, for master or mate, as the case may be, having previously failed. The names of these candidates appear upon the books as often as they came forward. They are, however, permitted to have a second trial without paying another fee, but on each successive occasion after that the full amount of the fee is collected from them.

I am, sir, your obedient servant,

W. H. SMITH, .
Chairman.

APPENDIX No. II.

REPORT OF ALFRED OGDEN AS TO EFFICIENCY OF LIFE STATIONS
BOATS AND CREWS.

BEDFORD, N. S., 12th September, 1894.

WM. SMITH, Esq.,
Deputy Minister of Marine and Fisheries,
Ottawa.

SIR,—In compliance with the instructions contained in your letter of the 5th instant, ref. 9535, I append hereto a report of my inspection of life saving stations for 1894.

Pictou Island Station.

Visited 4th July. Coxwain and two of the crew only present, as one of the two crew had a death in his family I did not summon there for a drill.

I found the boat nicely painted and everything about the boat-house in first class order. Since my visit, last year, new hinges to scuppers had been placed on the scuppers, and the launch ways had been greatly improved without cost to the department.

The old cork jackets are getting tender and uncomfortable to the bearer, I would recommend that seven new ones be supplied.

Seal Island Station.

Visited 17th August by steamer "Newfield" which landed the new boat, recently constructed at Shelburn by Mr. J. McGill. I found the old boats and everything connected with them in good order, all materials recommended last year had been supplied.

It is my opinion that 10 new metallic rowlocks should be supplied for the new Life Boat, which has now only the wooden tholl pins, which I think are not as safe, as the former and in rough water the oarsman has not as good command of his oar.

The size of rowlock required is 4 inches in diameter.

Mud Island Station.

Visited 17th August by steamer "Newfield". The life boat had not been launched since I inspected it last season.

I advised Mr. Churchill to put ventilators into the airtight compartments of the boat and have it overhauled and launched at once which he promised to do.

The large life boat, used as a despatch boat, in case of a wreck was afloat and in good condition.

In the event of a wreck, shelter is provided in two large houses, and Mr. Crowell informs me that he has on hand all winter, a good stock of provisions sufficient to feed a large number of persons until communication could be made with the main land. All materials recommended last year had been supplied to this station.

Devils Island Station.

Visited 28th August. The coxswain was in Halifax getting the scuppers of the life boat repaired, the remainder of the crew were out fishing.

The boat, boathouse and all of the appliances were in order and good condition. Last year this crew exercised in my presence and I found them to be excellent oarsmen, strong and active.

Herring Cove Station.

Inspected 29th August. Coxswain and two of the crew present the others were scattered about, some out fishing. Last season I had them exercised and found them to be a very fine crew.

Everything was in position and in good order, except the boat which had not been painted since last year, it is a metallic boat and should not be allowed to remain unpainted. The Coxswain told me that he had no paint to use.

One single 9 inch patent block, iron strapped, for hauling up boat and a new axe are required.

Duncan Cove Station.

Inspected 29th August. Coxswain and 2 men present, found everything in good order, and in proper position.

When launching this boat the launch ways have to be levelled up with stone which causes delay, and in the event of there being a wreck, there would be confusion, especially at night.

I would recommend that permanent skids be laid and ballasted with stone, upon which the launch ways can be placed and adjusted without delay and there would be less risk of getting the boat off the launch ways, which might occur in using the ways as at present constructed. The cost would not exceed \$10 or \$15.

The material recommended last year for two stations had been supplied.

Cape Tormentine Station.

Inspected 3rd instant. The boat has been neatly repaired and painted and all of the appliances were in their proper places and in good order. The boat was launched and the crew exercised, they handled their oars well, and are all able bodied and active men.

A cradle is required to place under the boat upon the trolly, as it has now to be hauled up and down upon small wooden rollers.

There should be a wooden launch way, 150 feet long ; 8 inches by 4 inches, square timber, covered with flat iron, 2 inches by $\frac{3}{4}$ -inch for the trolly to run upon. This would save the boat from damage, expedite launching and enable its being hauled up in rough weather, which cannot be done now.

The following articles are required :—

1 double-barrel winch.....	\$ 50
200 feet $3\frac{1}{2}$ -inch manilla rope.....	10
2 $8\frac{1}{2}$ -inch patent, single blocks.....	5
40 fathoms 9-thread hemp heaving line.....	2
1 3 gallon water keg, kerosene oil and can and lamp wicks....	5
	<hr/>
	\$ 72

Yarmouth Station.

Inspected 6th November, boat had been recently repaired and painted, all appliances were in good condition.

The wind was blowing a strong gale from the N.N. west, and a heavy surf rolling in upon the shore. The boat was launched and the crew displayed great activity and good oarsmanship, and handled their boat well.

Nothing is required at this station.

Cape Sable Station.

At Barrington passage I met Mr. Doane, the light-keeper, who has charge of the metallic life-boat at Cape Sable Island. He informed me that the boat had been newly painted, and was in good order, but the cork jackets recommended last year had not been supplied. As there are no jackets there, I would strongly recommend that they be forwarded as soon as possible.

As Mr. Doane was then off on leave of absence and a storm approaching, I did not attempt to get to the island, but proceeded to—

Blanche Station.

Arrived there on the 8th, and found the boat-house and all appliances in good order and well kept. This boat needs repairs. The ballast tanks, on the port side are leaking, permitting the water to flow freely into the bilge which will in a short time rot the wood.

Eight new scupper hinges.

Twenty-five fathoms 3-inch manilla rope.

Forty fathoms 9-thread hemp, heaving lines are required.

The iron to cover the launch ways recommended last year has not been supplied.

As this is an important station, I would urge that the repairs required and the material asked for be attended to as soon as possible

Port Mouton Island.

Inspection 10th November. The boat, boat-house and all appliances are in good order, except the launchways, which are not good, and in rough weather there is considerable risk of damaging the boat in launching. About \$20 would, I think, put the launchway in good order.

Some of the crew were away, and, there being a heavy surf on the beach, I did not ask the coxswain to launch the boat.

I have not been able to obtain a passage to *St. Paul's Island* during the fine weather, and as my other duties will occupy all my time during the remainder of the year I will not have the privilege of visiting it this season.

I am of the opinion that the self righting and self bailing life-boats can be improved by the addition of ventilation being placed in the decks on each side, forward and aft, permitting a current of air to pass through the entire length of the boat when not in use, thus preventing dry rot.

If I can obtain a plan of these boats I will forward to the department a plan of the ventilators which I would recommend.

White Head Station.

Visited 15th September, last. On my arrival at this station at 10.30 o'clock, a.m., I found that the crew were out in the boat for exercise, and at 2.30 p.m. they returned to the boat-house. The boat, boat-house and all appliances were in first rate order except the bilge pump, which needed repairing, which I made. After making the necessary repairs to the pump I exercised the crew for an hour and was well satisfied with the manner in which the boat was handled.

Scattarie Island.

I visited this station on the 18th September. The boat, boat-house and all appliances were in good order and in proper position.

As I had to walk 9 miles over the barrens to and from the station, and night approaching, I had not time to exercise the crew before dark, but I saw them and they are all strong abled bodied fishermen.

Sable Island.

I arrived at No. 1 station on the steamer "Newfield" on the morning of the 4th October, and found all appliances in order and the boats in good condition, except the "Despatch" boat which had not been launched for about two years, until last month when it was required for the purpose of conveying to the main land some of the officers and crew of the stranded bark "Nicosia."

Upon placing the boat into the water, it leaked so badly that it could not be bailed dry and the voyage was abandoned.

On examination I found that many of the seams in the plank were open and one butt sprung from off the timber. The superintendent, Mr. Boutillier, informed me that he would be able to make temporary repairs to it at the station.

This boat is carvil built with plank but $\frac{1}{2}$ -inch thick, and light timbers 10 inches apart, with false timbers between which were put in after the boat had been a year or two on the island. This boat is weak and in my opinion unfit for the service for which it was intended.

I think, that a boat similar in size and construction to the "Embree" boat, now at the Marine and Fisheries wharf, Halifax, with centre board instead of a deep keel, would be more suitable for this station.

On the evening of the 5th and the morning of the 6th when opposite stations Nos. 3 and 4 there was a heavy surf upon the beach and a storm approaching, and there being a risk of my being left upon the island, the captain of the "Newfield" deemed it inadvisable for me to go on shore, consequently I had no opportunity of visiting these stations.

The superintendent reports this as being in good condition and the boats in good order.

I had an opportunity of seeing the crews handling the surf boats in very rough water and found them to be good oarsmen. The coxswains handle their boats with skill.

I am, sir, your obedient servant,

ALFRED OGDEN.

STATEMENT relative to Life-Boat Stations

Stations.	Established.	Coxswain.	Number of Crew.	Salary of Coxswain.	Wages of Crew.
Blanche, N.S. . . .	Sept. —, 1889...	W. A. B. Smith.	6	\$75 per annum and \$1.50 for each drill.	\$1.50 each drill, twice a month.
Cape Sable, N. S.		Light-keeper...	No organized crew.		
Cobourg, Ont.	Nov. 7, 1882...	D. Rooney.	6	\$75 per annum and \$1.50 for each drill.	\$1.50 each drill, twice a month.
Collingwood, Ont.	Sept. 2, 1885...	P. Doherty.	6	do ..	do ..
Devil's Island, N.S.	1885..... Reorganized in 1890.	Fredk. Edward	6	do ..	do ..
Duncan's Cove, N.S.	1886.....	R. E. Monk	6	do ..	do ..
Goderich, Ont.	Oct. 21, 1886...	Wm. Babb.	6	do ..	do ..
Herring Cove, N.S.		James Dempsey.	No organized crew.		
Mud Island, N.S.		Jacob Pitman.	do	\$30 ..	
Pelee Island, Ont.		A. Henning	6	\$75 per annum and \$1.50 for each drill.	\$1.50 each drill, twice a month.
Pictou Island, N.S.	Nov. 23, 1889...	D. McLean.	6	do ..	do ..
Poplar Point, Ont.	April 20, 1883...	L. Spafford.	6	do ..	do ..
Point Travers.					
Port Hope, Ont.	Nov. 6, 1889...	C. R. Nixon.	6	\$75 per annum and \$1.50 for each drill.	\$1.50 each drill, twice a month.
Port Mouton, N.S.	do —, 1889...	J. Maxwell.	6	do ..	do ..
Port Rowan, Ont.	Oct. 19, 1883...	J. W. McColl.	6	do ..	do ..
Port Stanley, Ont.	June 25, 1885...	Wm. Berry.	6	do ..	do ..
Sable Island, N.S.	1885.....	Supt. Humane Establishment.	From staff of Humane Establishment.	Paid as superintendent and staff of Humane Establishment.	
Scatterie, N. S.	1885..... Reorganized in 1890.	Jas. N. Brown.	6	\$75 per annum, and \$1.50 for each drill.	\$1.50 each drill, twice a month.
Seal Island, N.S.	1880	Light-keeper...	No organized crew.		
St. Paul's Island, N.S.		Supt. Humane Establishment.	do		
Tormentine, Cape.		W. B. Walsh, Bayfield.			
Toronto, Ont.	Mar. 1, 1883...	W. Ward	6	\$75 per annum, and \$1.50 for each drill.	\$1.50 each drill, twice a month.
Wellington, Ont.	Mar. 17, 1883...	H. McCullough.	6	do ..	do ..
Whitehead, N. S.	June 6, 1890...	H. P. Munroe	6	do ..	do ..
Yarmouth, N.S.	1886..... Reorganized in 1889.	R. Carroll	6	do ..	do ..

maintained by the Dominion Government in Canada.

Value of Boat.	Description of Boat.	Equipment.	Where built.	Expenditure for Fiscal Year ended 30th June, 1894.
\$				
575	Self-righting and self-bailing, 25 feet over all, 8 feet beam, Dobbins' pattern.	Full equipment, as required in regulation boat-house.	Dartmouth, N.S.	
.....	Metallic life-boat, 16 feet keel, 5 feet beam.	Ordinary outfit		
575	Self-righting and self-bailing, 25 feet over all, 8 feet beam, Dobbins' pattern.	Full equipment, as required in regulation boat-house.	Goderich, Ont ..	
575	do	do	do ..	
575	do	do	Dartmouth, N.S.	
575	do	do	do ..	
575	do	do	Goderich, Ont ..	
.....	Metallic life-boat, 28 feet keel, 6 feet beam.	Full equipment.....	New York.....	
.....	Fishing boats and dorys (not Government property).	.....	
575	Self-righting and self-bailing, 25 feet over all, 7 feet beam, Dobbins' pattern.	Full equipment, as required in regulation boat-house.	Goderich, Ont ..	
575	do	do	Dartmouth, N.S.	
550	Self-righting and self-bailing, 26 feet over all, 7 feet beam, Dobbins' pattern.	do	Buffalo, U.S. ...	
620	Self-righting and self-bailing, 26 feet over all, 7 feet beam, Dobbins' pattern.	Full equipment, as required in regulation boat-house.	Goderich, Ont ..	
575	do	do	Dartmouth, N.S.	
.....	Surf boat, 26 feet long, 6½ feet beam.	Full equipment and boat-house.	Buffalo, U.S.	
575	Self-righting and self-bailing, 25 feet over all, 7 feet beam.	do	Goderich, Ont ..	
.....	Two boats as described above, Dobbins' pattern; one ordinary life-boat fitted with airtight compartments; one metallic life-boat; one surf boat; and one large despatch boat, schooner rigged, equipped for sea-going.	Boat-house, full equipments, &c.	.....
.....	Self-righting, &c., same as others, Dobbins' pattern, and clinker-built ships' life-boat, 21 feet keel.	Full equipment and boat-house.	Dartmouth, N.S.	
.....	Wooden life-boat, 25 feet long, 6 feet beam, fitted with airtight compartments.	do	Halifax, N.S. ...	
.....	Two surf boats, one 25 feet over all, 6½ feet beam, the other 23 feet long, 4 feet 8 inches beam.	.....	do	
.....	.....	Not yet equipped		
575	Self-righting, &c., same as others, Dobbins' pattern.	Full equipment and boat-house.	Goderich, Ont ..	
1,400	do	do	Buffalo, U.S.	
575	do	do	Dartmouth, N.S.	
575	do	do	do	

APPENDIX No. 12.

LIST of Persons to whom Rewards have been granted by the Government of Canada, for the year 1894, for gallant and humane services rendered in saving life from shipwrecked vessels, or by British and Foreign Governments for similar services rendered by Canadian vessels in saving life from shipwrecked British and foreign vessels for same period.

Names and Designations of Persons.	Nature of Services rendered.	Date of Services rendered.	Description of Reward.
Capt. John Anderson, master; J. McD. Howie, chief officer; D. Jones, boatswain; Fred. McIntyre, Olaf Johnston, C. McDowall and Jas. Cavanagh, seamen; of the barque "Arethusa" of Greenock.	Humane and gallant services in the rescue of the captain's wife and the shipwrecked crew of the barque "Africa" abandoned at sea.	June 8, 1892.	A binocular glass to master, value £5; gold watch to chief officer, value £20; silver watch to boatswain, value £9, and a silver watch to each of the four seamen, value, £4.
Capt. F. Gagnon, Samuel Gagnon, of Cape Chat; and Joseph Nubé, of Pasbebiac, P.Q.	Humane services in the rescuing of two fishermen from drowning.	Aug. 12, 1893.	A binocular glass to Mr. Samuel Gagnon and Mr. Nubé; \$5 to Capt. Gagnon for payment of subsistence expenses of the two men in his vessel. A letter of thanks from the Minister of Marine and Fisheries.
Mr. Elliot C. Hadley, keeper; Albert L. Whitten, assistant, light station at Thatcher's Island, Rockport, Massachusetts.	Humane services in the rescue of the crew of the schooner "Lottie B." of St. John, N.B., which vessel struck the Londoner Shoal near Cape Ann, coast of Massachusetts, and was driven on the rocks at Thatcher's Island.	Aug. 24, 1893.	A silver watch to each, value \$35.
Capt. Hans Arronsen, master of the Norwegian barque "Medea," of Russia.	Rescue of the wrecked crew of the sailing ship "Nellie Murphy," of Yarmouth, N.S., abandoned at sea.	Aug. 28, 1893.	The thanks of the Government of Canada; payment to the owners of "Medea" of £22 11 0 d. for compensation for the subsistence of the wrecked crew and the detention of the vessel.
Capt. Wm. Jean, of schooner "W. J. B."	Rescue and kind treatment of six fishermen blown to sea, off Miscou Island, from two boats.	Aug. 31, 1893.	A letter of thanks from the Minister of Marine and Fisheries, and paid \$15 for subsistence expenses of the shipwrecked crew.
Mr. H. F. Butler, of Allison, Ont.	Courage and humanity in saving Henry Darke, light keeper, at Fox Island, from drowning.	Sept. 5, 1893.	Honorary testimonial on vellum from the Royal Humane Society of London, Eng.
Capt. José Guerrica, master of the Spanish steamer "Palentino" of Bilbao.	For the rescue and generous and humane treatment of the three survivors of the crew of the schooner "Windermere," of Port Medway, N.S., which vessel was capsized in the Gulf of Mexico, and crew rescued, when taken off the wreck, more dead than alive, having been clinging to it for 9 days, without food except 3 small birds caught at night, which they ate raw, and no drink but what they could suck from their clothes when it rained.	Sept. 16, 1893.	A binocular glass, value £5, and the thanks of the Government of Canada. On the vessel's arrival at Boston, Mass., the British consul expressed his warm thanks to the captain and paid the subsistence at the usual Board of Trade rate.

LIST of Persons to whom Rewards have been granted, &c.—*Continued.*

Names and Designations of Persons.	Nature of Services rendered.	Date of Services rendered.	Description of Reward.
Captain Frank Burke, of the British tug "Reliance.	Heroic services in affecting the rescue of the American tug "Acme" on Lake Huron.	Oct. 11, 1893.	A gold watch and chain from the President of the United States.
Captain F. Robblee, master of schr. "Muriel."	Humane services in the rescue of the crew of the Yarmouth brigantine "Hattie F. Rich," foundered at sea.	Oct. 16, 1893.	The thanks of the Minister of Marine and Fisheries, and payment to owners of the subsistence expenses of the shipwrecked crew, \$20.69.
Joseph Buford Graham, M.D., quarantine officer, Port of Savannah, Georgia, and Peter Dodge, coloured boy.	Rescuing and saving at great risk the 10 men of the crew of the "Mary E. Chapman," of St. John, N.B., wrecked on Stonehorse Reef, Tylee Island, off Savannah.	Feb. 25, 1894.	The thanks of the Government of Canada. A gold watch, value \$50, to Dr. Graham. A silver medal, value \$25, to Peter Dodge.
Giosue Cafiere fu Stefano, owner of the Italian barque "Orobla."	Services in the rescue of 12 men from the barque "Lotus" of Pictou, N.S., foundered at sea.	Mar. 26, 1894.	Paid £17 expenses incurred in the landing of the shipwrecked crew at St. Vincent, Cape de Verde Islands.
Mr. Seth Aines, of Alliston, Ont.	Saving a boy from drowning.	April 16, 1894.	A certificate and medal from the Royal Humane Society of London, Eng.
Mr. W. A. B. Smith, coxswain, and crew of lifeboat at Blanche, N. S., and two extra hands.	Assistance in landing the wrecked crew of the steamship "Bamboro," which vessel ran ashore on the Half Moon Rocks.	April 21, 1894.	\$3 each to the six men of the lifeboat crew, and \$1.50 to each of the extra men—\$21 in all.
Angus McLeod, Daniel McLeod, George Corbett and Wm. V. Gwyn.	Services in rescuing 2 fishermen from an upturned fishing boat in Aspey Bay, Cape Breton.	May 18, 1894.	Commended by the Minister of Marine and Fisheries as having done an act of humanity, such as he would expect from brave men.
Joseph Boutin, of Ste. Anastasie de Nelson, County of Megantic, P.Q.	Services in rescue of 25 persons from the water at Point Levis, P.Q., in an accident caused by the breaking of a gangway and by which 60 persons were precipitated into the water.	July 16, 1894.	The Minister of Marine and Fisheries learned of the heroism of the young man and his meritorious conduct afforded him much satisfaction.
Herbert C. Kirkland, sixteen years of age.	Heroic conduct in saving Garfield Beerman from drowning in the Rideau Canal at Lyndhurst, Ont.	July 26, 1894.	Honorary testimonial on vellum from the Royal Humane Society of London, Eng.

APPENDIX No 13.

STATEMENT of Sick Mariners' Dues collected for the fiscal Year ended 30th June, 1894.

<i>Quebec.</i>	\$ cts.	<i>Nova Scotia—Concluded.</i>	\$ cts.
Gaspé.....	35 64	Bridgetown.....	3 70
Montreal.....	4,833 58	Canso.....	143 16
New Carlisle.....	336 42	Digby.....	145 84
Percé.....	69 78	Halifax.....	6,946 30
Quebec.....	7,956 90	Kentville.....	23 94
Rimouski.....	361 30	Liverpool.....	12 02
St. Armand.....	10 24	Lockeport.....	29 96
St. Johns.....	1,110 48	Lunenburg.....	390 80
Sorel.....	84 70	North Sydney.....	1,345 36
Stanstead.....	22 14	Parrsboro'.....	1,224 24
Three Rivers.....	303 13	Pictou.....	464 60
Total.....	15,124 31	Port Hawkesbury.....	127 42
		Shelburne.....	116 42
<i>New Brunswick.</i>		Sydney.....	3,185 04
Bathurst.....	289 43	Weymouth.....	178 64
Chatham.....	1,781 00	Windsor.....	826 92
Dalhousie.....	473 64	Yarmouth.....	277 52
Dorchester.....	43 20	Total.....	16,882 53
Moncton.....	986 20		
Newcastle.....	590 16	<i>Prince Edward Island.</i>	
Sackville.....	360 08	Charlottetown.....	321 78
St. Andrews.....	149 00	Summerside.....	138 76
St. Johns.....	4,684 38	Total.....	460 54
St. Stephen.....	104 08		
Total.....	9,461 02	<i>British Columbia.</i>	
		Nanaimo.....	3,285 08
<i>Nova Scotia.</i>		New Westminster.....	19 54
Amherst.....	792 29	Vancouver.....	1,582 00
Annapolis.....	169 54	Victoria.....	2,329 26
Arichat.....	166 96	Total.....	7,215 88
Antigonish.....	26 50	Grand total.....	49,177 98
Baddeck.....	173 30		
Barrington.....	12 06		

F. GOURDEAU,
Accountant.WM. SMITH,
Deputy Minister of Marine and Fisheries.

APPENDIX No. 14.

57-58 VICTORIA, CHAP. 42.

An Act further to amend the Act respecting Certificates to Masters and Mates of Ships. (*Assented to 23rd July, 1894.*)

Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows :—

1. Section one of the *Act respecting Certificates to Masters and Mates of Ships*, chapter seventy-three of the Revised Statutes, is hereby amended by adding the following paragraphs thereto :—

“(j.) The expression ‘West Indies’ means the West India Islands, and includes the Bahama and Bermuda Islands, and any port or place in the gulf of Mexico not being a port or place in the United States of America, and includes any port or place on the mainland between the gulf of Mexico and the south-eastern extremity of French Guiana.

“(k.) The expression ‘South America’ means any port or place on the mainland or adjacent islands between the southeastern extremity of French Guiana and the isthmus of Panama in the Pacific Ocean following the coast line by way of Cape Horn.”

2. The paragraphs substituted by section one of chapter twenty-one of the Statutes of 1889 for paragraphs (e) and (g) of section one of the said Act are hereby repealed and the following substituted therefor :—

“(e.) The expression ‘sea-going ship’ includes every ship employed in trading or going between some port or place in Canada and some port or place out of Canada, not being a port or place in Newfoundland or in St. Pierre or Miquelon, or in the United States of America, or in the West Indies or South America, or in Central America or Mexico.”

“(g.) The expression ‘coasting voyage’ includes a voyage between Canada and Newfoundland or St. Pierre or Miquelon or a port or place in the United States of America, or in the West Indies or South America, or in Central America or Mexico.”

3. Section two of the said Act is hereby repealed, and the following substituted therefor :—

“2. Examinations may be instituted in Canada, for British subjects or for persons domiciled in Canada for at least three years who intend to become masters or mates or second mates of sea-going ships’ or who wish to procure the certificates of competency for sea-going ships hereinafter mentioned ; and foreign subjects serving in sea-going ships registered in Canada shall be deemed to be domiciled in Canada while so serving.”

4. The section substituted by section two of chapter forty-one of the Statutes of 1891, for section three of the said Act, is hereby repealed and the following substituted therefor :—

“3. Examinations may be instituted in Canada, for British subjects or for persons domiciled in Canada for at least three years who intend to become masters or mates of ships trading on the inland waters of Canada, or on the minor waters of Canada, or on coasting voyages, or who wish to procure the certificates of competency or service hereinafter mentioned ; and foreign subjects serving in ships registered in Canada, and trading on the inland waters of Canada, or on the minor waters of Canada, or on coasting voyages, shall be deemed to be domiciled in Canada while so serving.”

5. Section nine of the said Act is hereby repealed and the following substituted therefor, —

“9. No ship registered in Canada, over one hundred tons registered tonnage, shall go to sea from any port or place in Canada, on a voyage to any port or place out of Canada not being a port or place in Newfoundland, or in St. Pierre or Miquelon, or in the United States of America, or in the West Indies or South America, or in Central America, or in Mexico, unless the master and first mate or only mate thereof have

obtained and possess valid certificates either of competency or service for sea-going ships, appropriate to their several stations in such ship, or of a higher grade, from the minister—or valid certificates of competency or service for foreign going ships, appropriate to their several stations in such ship, or of a higher grade, from the Board of Trade in the United Kingdom,—or valid certificates of competency appropriate to their several stations in such ships, or of a higher grade, granted in any British possession, and declared by order of Her Majesty in Council published in the *London Gazette*, under the provisions of *The Merchant Shipping (Colonial) Act*, 1869, or of any Act of the Parliament of the United Kingdom, containing such provisions to be of the same force as certificates of competency for foreign going ships granted under the acts of the Parliament of the United Kingdom, relating to merchant shipping; and every person who, having been engaged to serve as master or first mate of any sea-going ship registered in Canada, over one hundred tons registered tonnage, goes to sea as aforesaid, as such master or mate, without being at the time entitled to and possessed of such a certificate either of competency or of service for seagoing ships, as hereinbefore required, or who employs any person as master, first mate or only mate of any such sea-going ship as aforesaid, without first ascertaining that he, at the time, is entitled to and possessed of such certificate, shall for each such offence incur a penalty not exceeding one hundred dollars."

6. The section substituted by section four of chapter forty-one of the Statutes of 1891 for section eleven of the said Act is hereby repealed and the following substituted therefor:—

"11. No sailing ship registered in Canada, over one hundred tons registered tonnage, and no steamship registered in Canada, shall go from any port or place in Canada on a voyage to any other port or place in Canada, or in Newfoundland, or in the United States of America, or in St. Pierre or Miquelon, or in the West Indies or South America, or in Central America, or in Mexico, or be licensed or allowed to ply on any Canadian water, unless the master thereof has obtained from the minister and possesses a valid certificate of competency or service as master of a ship trading on the inland waters of Canada, or on the minor waters of Canada, or on coasting voyages, as the case may be, of the class and description to which such ship belongs, or of a higher class or description,—or a valid certificate of competency or service as master for sea-going ships, from the minister,—or a valid certificate of competency as master, for foreign-going ships, from the Board of Trade in the United Kingdom,—or a valid certificate of competency as master, granted in any British possession and declared by order of Her Majesty in Council published in the *London Gazette*, under the provisions of *The Merchant Shipping (Colonial) Act*, 1869, or of any Act of the Parliament of the United Kingdom, containing such provisions, to be of the same force as a certificate of competency, as master for foreign-going ships, granted under the Acts of the Parliament of the United Kingdom relating to merchant shipping; and no ship registered in Canada over two hundred tons registered tonnage, and no steamship registered in Canada and allowed by law to carry more than forty passengers, shall go from any port or place in Canada, on a voyage to any other port or place in Canada, or in Newfoundland, or in the United States of America, or in St. Pierre or Miquelon, or in the West Indies or South America, or in Central America, or in Mexico, or be licensed or allowed to ply on any Canadian water, unless such ship carries also a mate who has obtained from one of the authorities mentioned in this section a valid certificate of competency or service as such mate or as the mate of a ship of a higher class or description."

7. The subsection substituted by section five of chapter forty-one of the Statutes of 1891 for subsection one of section fourteen of the said Act is hereby repealed and the following substituted therefor:—

"14. The master of every ship trading on the inland waters of Canada, or on the minor waters of Canada, or on coasting voyages, required by this Act to be commanded by a master having a certificate of competency or of service as aforesaid, shall produce to every officer of the customs in Canada to whom he applies for a clearance or for a *transire* coastwise for such ship, on any voyage from any port or place in Canada to any other port or place in Canada, or in Newfoundland, or in the United States of America,

or in St. Pierre or Miquelon, or in the West Indies or South America, or in Central America, or in Mexico, or for a license for the season in respect of such ship, the certificate of competency or service which the said master is hereby required to possess; and if such ship is also required to carry a mate having such certificate as aforesaid, the master shall, at the same time, produce to such officer of the customs the certificate of such mate."

8. Instead of the fees provided by sections six and eight of the said Act, the Governor in Council may establish a scale of fees to be charged for certificates to masters and mates; and until so established, the fees to be charged shall be the following, that is to say:—For a certificate of competency as master, fifteen dollars; for a certificate of competency as mate of a sea going ship, eight dollars; for a certificate of competency as mate of a ship trading on the inland waters of Canada, or on the minor waters of Canada, or on coasting voyages, six dollars; for a certificate of service as master, eight dollars; for a certificate of service as mate for a sea-going ship, five dollars; and for a certificate of service as mate for a ship trading on the inland waters of Canada, or on the minor waters of Canada, or on coasting voyages, four dollars.

57-58 VICTORIA, CHAP. 47.

An Act respecting Public Harbour. (*Assented to 23rd July, 1894.*)

Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. The Governor in Council may by proclamation declare to be a public harbour any area covered with water within the jurisdiction of the parliament of Canada; and he may by the same or a like proclamation extend the area of any existing public harbour in Canada, and thereupon all statutes, rules and regulations affecting such public harbour shall apply thereto as so extended.

2. Any public harbour created by proclamation under this Act shall be deemed to be a port within the meaning of The Harbour Masters Act.

3. The Governor in Council may make rules and regulations for the government of any public harbour or port in Canada; but in the case of the ports of Quebec, Montreal, Three Rivers, Toronto, Halifax, Pictou, and the port of St. John, in the province of New Brunswick, such rules and regulations as are inconsistent with any rule or regulation of any of these ports shall not be made until application therefor from the local authorities in charge of the port have been received by the Governor in Council.

4. The Governor in Council may by any such regulation impose a penalty, not exceeding in any case \$100, for the violation of any such regulation, and, in the case of a continuing violation, a further penalty not exceeding in any case \$10 for every twelve hours during which such violation continues; but no such regulation shall impose a minimum penalty; and every violation of any such regulation shall be deemed a violation of this Act, and every such penalty shall be held to be a penalty imposed by this Act.

57-58 VICTORIA, CHAP. 41.

An Act to amend the Act respecting Lighthouses, Buoys and Beacons, and Sable Island. (*Assented to 23rd July, 1894.*)

Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. Section five of *An Act respecting Lighthouses, Buoys and Beacons, and Sable Island*, chapter seventy of the Revised Statutes, is hereby repealed and the following substituted therefor:—

"5. The Governor in Council may appoint keepers whose salaries are over two hundred dollars a year, superintendents, and such other officers as are necessary for the purposes of this Act.

"2. The Minister of Marine and Fisheries may appoint keepers whose salaries are two hundred dollars a year or less.

"3. The Minister of Marine and Fisheries may make contracts for supplies or purchase supplies, for the use of lighthouses, beacons, light-ships, floating and other lights, lanterns and signals, and generally may do all such things as are necessary for carrying this Act fully into effect."

57-58 VICTORIA, CHAP. 50.

An Act to amend the Harbour Masters Act. (*Assented to 23rd July, 1894.*)

Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. Section four of *The Harbour Masters Act*, chapter eighty-six of the Revised Statutes, is hereby repealed and the following substituted therefor:—

"4. The Governor in Council may from time to time appoint a fit and proper person to be harbour master for any port to which this Act applies and may also appoint deputy harbour masters for any such port."

57-58 VICTORIA, CHAP. 49.

An Act further to amend the Acts respecting the Harbour of Pictou in Nova Scotia. (*Assented to 23rd July 1894.*)

Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. Chapter sixty-three of the Statutes of 1873, intituled *An Act respecting the Harbour of Pictou, in Nova Scotia*, and the Acts in amendment thereof, shall extend and apply to the public wharf at New Glasgow, in the county of Pictou, and to any other wharves which the harbour commissioners of Pictou build at New Glasgow, as fully as if the said wharves were mentioned in the said Acts for the purposes thereof.

57-58 VICTORIA, CHAP. 43.

An Act to amend the Seamen's Act. (*Assented to 23rd July, 1894.*)

Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. Section 59 of The Seamen's Act, chapter 74 of the Revised Statutes, is hereby repealed, and the following substituted therefor:—

"59. Every master of a ship registered in any of the said provinces shall, so far as the case permits, have the same rights, liens and remedies for the recovery of his wages, and for the recovery of disbursements properly made by him on account of the ship, and for liabilities properly incurred by him on account of the ship, which by this Act or by any law or custom any seaman, not being a master, has for the recovery of his wages; and if, in any proceeding in any court possessing admiralty jurisdiction in any of the said provinces touching the claim of a master to wages, or such disbursements and liabilities as aforesaid, any right of set-off or counter claims is set up, such court may enter into and adjudicate upon all questions and settle all accounts then arising or outstanding and unsettled between the parties to the proceeding, and may direct payment of any balance which is found to be due."

2. Section 69 of the said Act is hereby repealed and the following substituted therefor:—

"69. The Governor in Council may pay any reasonable expenses incurred by the Board of Trade of the United Kingdom, or by any officers of Her Majesty in any British possession other than Canada, or in any foreign country, on account of subsistence or transport back to Canada of any seamen or apprentices who have been domiciled in Canada for twelve months and who have been found in distress, either on account of shipwreck or otherwise, in any place out of Canada, out of any moneys applicable to the relief of distressed seamen and granted by the parliament of Canada for the purpose,—on the production of the bills of the disbursements, with the proper vouchers and such other evidence as the Governor in Council requires; and persons serving in ships registered in Canada shall, for the purpose of this section, be deemed to be domiciled in Canada while so serving."

57-58 VICTORIA, CHAP. 45.

An Act to amend the Inspection of Ships Act. (*Assented to 23rd July, 1894.*)

Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. Section eight of *The Inspection of Ships Act*, chapter thirty-seven of the Statutes of 1891, is hereby repealed and the following substituted therefor:—

“8. Notwithstanding anything to the contrary contained in section three of this Act, every inspector may, at any time, visit any ship, whether registered in Canada or elsewhere, and whether propelled wholly or in part by steam, except ships belonging to Her Majesty, and inspect and examine the tackle, machinery or apparatus used for the loading or unloading thereof; and if he considers such tackle, machinery or apparatus defective so as to be dangerous to life he shall report thereon to the minister, who may order that such tackle, machinery and apparatus shall not be used until permitted by the minister; and any tackle, machinery or apparatus used in violation of such order shall be liable to forfeiture and seizure by the chief officer of customs at any port, and may thereupon be sold in the same way and under like provision as goods liable to forfeiture for non-payment of customs duties; and the owner of the ship shall incur a penalty of one hundred dollars, and such ship shall be liable for such penalty.”

57-58 VICTORIA, CHAP. 46.

An Act further to amend the Steamboat Inspection Act. (*Assented to 23rd July, 1894.*)

Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. Section four of *The Steamboat Inspection Act*, chapter seventy-eight of the Revised Statutes, as amended by section two of chapter twenty-six of the Statutes of 1888, is hereby repealed and the following substituted therefor:—

“4. No steam yacht used exclusively for pleasure or private use without hire or remuneration of any kind, no tug boat or freight boat under one hundred and fifty tons gross tonnage, no steamboat used exclusively for fishing purposes and under one hundred and fifty tons of gross tonnage, no steam dredge or floating elevator or vessel of like kind, shall be subject to the requirements of this Act, except as regards the yearly rate or duty and the inspection fees hereinafter imposed and the inspection of their boilers and machinery—to which they shall be subject at least once in each year, and oftener if required, under the same provisions and penalties for neglect as other steamboats—and except also as to the obligation to carry one life-buoy and take the precautions against fire hereinafter imposed upon all steamboats, and to carry a life-preserver for each person on board; and no steam yacht used exclusively for pleasure or private use without hire or remuneration of any kind, of three tons gross tonnage and under, shall be subject to any of the provisions of this Act.”

2. Notwithstanding anything contained in the said chapter seventy-eight of the Revised Statutes, or in any other Act prior to the said Act, relating to the inspection of steamboats, the imposition of any rate or duty levied on any steamboat is hereby declared to have been and to be legal and valid.

3. Section fifty-five of the said Act is hereby repealed and the following substituted therefor:—

“55. Every ship carrying passengers shall be provided with good and sufficient gangboards, protected at the sides in a suitable manner to prevent passengers from falling overboard; and the master of every such ship shall, on stopping at any wharf or landing place, cause such a gangboard to be firmly secured to the vessel for the safe and convenient transit of passengers, and shall cause to be affixed to such gangboard in the night time good and sufficient lights; and the owner or occupier of every such wharf or landing place who has reason to expect the arrival of any ship carrying passengers shall also, in the night time, cause to be shown conspicuously, on such wharf or landing place, and at every angle or turn thereof, during the whole of the time that any ship is approaching thereto or stopping thereat, a good and sufficient light.

“2. For the purposes of this section, the night, at all seasons of the year, shall be deemed to extend from one hour after sunset till one hour before sunrise.”

APPENDIX No. 16.

STATEMENT OF EXPENDITURE by the Marine Department from Confederation to 30th June, 1894.

	1868.	1869.	1870.	1871.	1872.	1873.	1874.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Maintenance of Lights—							
Above Montreal.	40,561 28	42,306 69	46,289 05	44,054 01	57,609 16	61,036 47	60,798 75
Montreal District.	23,053 56	25,762 54	21,699 49	22,463 52	22,369 00	31,143 14	20,939 13
Below Quebec.	45,615 65	41,651 73	43,730 61	31,582 75	41,936 00	65,545 00	102,056 09
Nova Scotia.	46,460 72	56,394 88	43,682 86	76,230 77	67,862 24	100,953 80	114,711 91
New Brunswick.	20,488 00	23,893 00	27,485 14	20,542 29	23,369 12	29,266 85	53,439 04
Prince Edward Island.							3,357 71
British Columbia.						13,207 09	18,519 50
Construction—							
Above Montreal.	3,136 15		2,976 83	8,770 55	6,940 45	19,999 38	24,461 86
Quebec.	7,323 75	7,492 59	1,543 06		57,818 35	39,303 87	41,950 82
Nova Scotia.	22,041 42	6,905 80	18,967 23	10,948 31	34,760 12	90,181 79	51,867 94
New Brunswick.			11,555 91	8,735 73	9,561 14	16,691 06	31,572 60
Prince Edward Island.							
British Columbia.							4,353 93
Dominion Steamers—							
Quebec.	69,026 73	37,176 02	34,549 49	59,797 05	47,500 00	51,758 05	64,490 00
Nova Scotia.	14,778 92	26,603 94	19,759 96	13,139 86	20,999 63	24,999 57	30,008 99
New Brunswick.							
Prince Edward Island.							
British Columbia.					12,115 96	15,984 72	10,555 67
Examinations of Masters and							
Mates.			908 12	1,407 66	4,312 07	6,466 18	4,520 19
Hudson's Bay Expedition.							
Investigations into wrecks.			140 00		874 00	1,068 89	2,313 31
Marine Hospital, Quebec.	19,977 36	19,221 45	21,618 73	19,823 18	21,000 00	21,000 00	20,456 45
Marine Hospitals.	1,070 86	15,615 71	15,652 62	15,728 93	23,536 16	27,150 43	45,986 87
Meteorological Service.	8,200 00	8,950 00	8,950 00	9,379 82	12,618 15	18,830 54	36,760 59
Registration of Canadian							
shipping.							272 30
Removal of obstructions.			2,350 07	1,000 00			
Rewards for saving life.					2,284 32	1,975 13	4,931 78
Signal Service.							1,000 00
Steamboat inspection.	7,106 93	7,999 00	7,396 96	8,321 00	8,500 00	13,266 00	10,291 58
Survey, Georgian Bay.							
Water Police, Montreal.	27,445 35	10,238 71	9,423 31	8,030 00	10,000 00	14,453 87	12,370 86
do Quebec.		12,623 59	9,038 62	9,370 73	10,348 00	18,200 00	26,526 66
Civil Government.	15,083 88	18,064 25	19,401 05	20,220 96	22,644 52	25,336 04	30,067 23
Steam Communication—							
Between Quebec and Mari-							
time Provinces.							15,000 00
Between Prince Edward							
Island and Mainland.							
Purchase of str. to replace—							
"Glendon".							
"Lady Head".							
Winter Mail Service, P. E. I.							
Tidal Observations.							
Gratuities.							
Survey, Burrard Inlet.							
Export Cattle Trade.							
	371,070 56	360,899 90	367,129 11	389,537 12	518,958 49	706,817 92	845,159 09

APPENDIX No. 16.—STATEMENT of Expenditure by the Marine Department from Confederation to 30th June, 1894—*Continued.*

	1875.	1876.	1877.	1878.	1879.	1880.	1881.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Maintenance of Lights—							
Above Montreal	71,937 18	68,344 18	65,421 00	73,175 11	74,587 78	65,518 61	67,541 21
Montreal District	15,000 00	12,999 48	15,998 00	15,996 09	14,917 95	16,523 88	14,326 36
Below Quebec	110,362 00	98,792 93	89,980 41	96,904 00	93,178 61	96,703 87	89,781 29
Nova Scotia	114,344 51	143,125 56	128,496 00	132,888 95	120,951 33	116,189 60	128,918 59
New Brunswick	60,119 02	62,551 61	50,998 00	58,989 00	57,499 02	61,252 82	63,921 90
Prince Edward Island	12,584 64	13,730 53	11,817 00	16,986 66	12,158 72	15,288 17	12,997 33
British Columbia	15,983 72	17,175 97	15,853 00	18,948 78	15,152 73	15,576 99	17,570 72
Construction—							
Above Montreal	14,286 65	13,320 40	16,267 98	7,207 90	11,993 75	13,297 81	14,180 02
Quebec	19,325 00	24,336 47	12,945 29	12,776 47	4,154 58	7,797 75	7,539 76
Nova Scotia	43,898 63	42,214 55	25,550 00	13,500 00	17,386 97	7,069 01	7,758 36
New Brunswick	8,842 97	17,819 85	7,083 82	12,028 13	22,598 14	4,985 53	4,578 52
Prince Edward Island	11,829 61	17,752 00	17,752 00	2,504 47	2,560 88	6,074 50	8,150 05
British Columbia	8,799 07	8,477 67	29 66				8,645 39
Dominion Steamers—							
Quebec	79,043 70	62,971 49	49,987 66	42,683 00	44,972 79	49,318 93	64,973 00
Nova Scotia	22,992 62	133,826 08	38,839 29	43,027 00	42,016 53	32,574 64	34,700 60
New Brunswick							
Prince Edward Island		16,241 26	61,782 63	28,933 63	16,333 05	14,429 52	15,139 95
British Columbia	41,796 74	19,156 56	16,095 90	12,193 40	8,460 68	9,733 34	11,788 09
Examinations of Masters and Mates	5,696 62	4,672 08	4,050 00	4,249 76	4,250 12	4,253 43	3,888 41
Hudson's Bay Expedition							
Investigations into wrecks	366 00	466 41	342 65	500 00	1,691 00	676 73	310 48
Marine Hospital, Quebec	21,994 75	23,795 85	19,965 97	19,987 50	20,791 77	19,991 22	19,964 33
Marine Hospitals	37,111 67	37,155 72	42,449 55	37,487 10	37,445 57	35,040 00	32,218 94
Meteorological Service	33,580 00	45,560 03	44,871 38	46,050 24	45,706 13	45,554 51	46,163 54
Registration of Canadian Shipping	1,096 46	412 06	842 14	1,435 10	239 26	257 75	607 43
Removal of obstructions	450 00		293 00	462 00	305 86	825 00	150 00
Rewards for saving life	3,552 86	2,292 20	1,958 55	4,071 00	2,833 10	2,263 15	1,806 13
Signal Service							
Steamboat Inspection	12,200 00	13,081 86	13,073 01	13,228 38	13,076 46	11,854 34	12,211 65
Survey Georgian Bay							
Water Police, Montreal	13,395 00	14,090 00	13,524 29	14,062 00	13,462 74	13,131 06	21,953 26
do Quebec	24,500 00	27,136 68	21,482 08	23,498 06	23,023 26	22,094 48	13,497 81
Civil Government	31,326 18	32,789 18	32,304 12	32,682 50	33,610 19	35,083 95	36,447 50
Steam Communication—							
Between Quebec and Maritime Provinces	10,000 00	10,000 00					
Between Prince Edward Island and Mainland		750 00					
Purchase of str. to replace—"Glendon"							
" Lady Head "							
Winter Mail Service, P.E.I.							
Tidal Observations							
Gratuities							
Survey, Burrard Inlet							
Export Cattle Trade							
	844,586 09	979,146 27	820,054 38	786,156 23	755,359 47	723,360 89	761,730 62

APPENDIX No. 16.—STATEMENT of Expenditure by the Marine Department from
Confederation of 30th June, 1894—*Continued.*

—	1882.	1883.	1884.	1885.	1886.	1887.	1888.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Maintenance of Lights—							
Above Montreal.....	71,048 50	70,116 68	70,788 27	70,697 89	85,718 98	75,690 74	85,588 70
Montreal District.....	21,643 05	22,250 32	22,946 43	23,262 94	33,289 28	16,735 49	17,510 17
Below Quebec.....	91,098 66	102,734 99	101,302 35	118,856 94	131,095 29	131,540 80	108,278 67
Nova Scotia.....	137,846 15	150,793 17	142,909 72	137,439 40	143,153 24	117,708 53	133,009 92
New Brunswick.....	66,073 00	75,947 92	86,670 70	92,130 28	76,046 63	96,425 28	73,465 49
Prince Edward Island.....	16,905 72	17,907 27	19,059 62	20,218 83	22,282 52	17,852 13	14,796 62
British Columbia.....	17,803 00	18,349 06	18,107 54	15,457 76	14,783 75	16,230 43	19,604 63
Cape Race.....						4,453 25	5,124 20
Construction—							
Above Montreal.....	13,581 00	9,782 27	18,432 63	27,977 42	36,678 16	18,383 20	6,341 97
Quebec.....	3,731 31	9,672 50	3,168 48	4,354 87	5,877 84	1,260 00	2,287 86
Nova Scotia.....	13,355 00	9,422 75	12,489 35	4,352 42	5,905 17	5,330 89	2,533 48
New Brunswick.....	2,253 80	1,022 57	2,868 70	7,667 42	2,421 66	5,280 75	1,542 61
Prince Edward Island.....	3,092 00	1,934 49	2,158 60	879 40		384 60	
British Columbia.....	3,237 90	1,005 26	9,830 38	5,223 11	4,942 70	321 84	6,918 00
Queen's Printer.....						26 58	
Dominion Steamers—							
Quebec.....	44,923 98	45,156 13	43,019 13	51,092 98	51,485 03	50,714 52	150,659 19
Nova Scotia.....	31,049 74	37,841 07	27,726 60	42,921 27	30,283 27	32,287 10	
New Brunswick.....					24,633 26	14,337 23	
Prince Edward Island.....	23,911 97	19,680 00	19,539 52	33,962 54	20,927 58	19,987 67	
British Columbia.....	8,504 61	25,484 00	16,111 83	12,485 07	13,430 69	10,809 07	
Department.....						13,288 83	
Examinations of Masters and Mates.....	3,982 00	4,021 20	5,580 79	6,656 44	5,239 28	4,858 98	5,063 96
Hudson's Bay Expedition.....			480 69	71,374 69	35,217 10	14,762 61	165 00
Investigations into wrecks.....	863 19	875 64	830 12	385 15	592 63	520 14	513 91
Marine Hospital, Quebec.....	19,938 12	19,998 53	19,990 34	19,996 68	16,047 95	19,706 96	18,777 62
Marine Hospitals.....	33,162 45	29,880 78	31,401 90	35,371 29	32,229 02	32,545 35	30,667 67
Meteorological Service.....	47,464 07	51,990 25	56,418 16	56,625 46	56,898 33	57,140 74	59,986 10
Registration of Canadian Shipping.....	2,013 28	168 84	189 27	237 88	157 13	233 13	897 02
Removal of obstructions.....	1,116 51	35 80	342 76	2,259 21	1,237 34	4,190 83	2,500 94
Rewards for saving life.....	2,212 00	2,534 60	2,614 91	5,221 15	8,147 22	7,363 94	6,825 48
Signal Service.....		3,365 33	6,704 17	3,881 05	4,622 00	5,082 17	4,441 59
Steamboat Inspection.....	14,835 00	16,209 00	21,893 28	23,235 04	21,775 57	22,837 80	21,430 45
Survey Georgian Bay.....		77 81	26,745 54	20,454 68	17,750 36	21,592 55	19,424 14
Water Police, Montreal.....	21,994 74	15,798 24	19,021 93	17,683 59	20,933 75	17,413 47	18,725 95
do Quebec.....	20,321 82	22,520 41	22,958 79	20,399 33	22,922 82	22,935 65	18,553 57
Civil Government.....	36,789 46	37,988 39	38,775 00	29,900 83	30,453 57	37,193 62	32,728 78
Steam Communication—							
Between Quebec and Maritime Provinces.....							
Between Prince Edward Island and Mainland.....							
Purchase of str. to replace—							
“Glendon”.....		395 55	56,164 71	47,238 03			
“Lady Head”.....							
Winter Mail Service, P.E.I.....					5,985 42	6,312 93	7,740 25
Tidal Observations.....							
Gratuities.....							
Survey, Burrard Inlet.....							
Export Cattle Trade.....							
	774,831 53	825,010 82	927,241 61	1,029, 01 14	980,120 59	917,557 31	883,250 85

APPENDIX No. 16.—STATEMENT of Expenditure by the Marine Department from Confederation to 30th June, 1894.—*Concluded.*

	1880.	1890.	1891.	1892.	1893.	1894.
	\$ cts	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Maintenance of Lights—						
Above Montreal.....	72,621 23	84,035 65	93,180 72	87,093 61	87,598 15	78,090 69
Montreal District.....	12,285 79					
Below Quebec.....	112,680 20	118,750 70	122,471 89	116,531 27	120,404 19	124,348 80
Nova Scotia.....	140,197 15	139,459 56	139,916 83	148,815 26	150,445 26	137,339 73
New Brunswick.....	78,285 79	61,608 91	61,089 31	66,886 69	71,079 46	59,917 96
Prince Edward Island.....	19,118 51	16,968 80	19,000 46	17,069 98	16,819 64	15,569 39
British Columbia.....	16,877 12	16,411 49	19,595 22	26,858 68	24,413 27	27,240 77
Cape Race.....	7,358 01					
Construction—						
Above Montreal.....	8,623 76		9,796 28	21,704 05	8,766 62	12,581 15
Quebec.....	12,203 06		3,723 14	809 27	10,097 18	4,743 13
Nova Scotia.....	6,089 91		4,596 94	1,965 16	4,381 24	3,104 77
New Brunswick.....	2,966 36	23,863 09	208 16	1,845 35	1,271 15	115 45
Prince Edward Island.....			410 00	1 56		1,604 00
British Columbia.....	1,890 00		14,417 25	9,478 81	2,958 61	6,357 43
Queen's Printer.....	40 14					
Dominion Steamers—						
Quebec.....						
Nova Scotia.....						
New Brunswick.....	126,629 33	114,956 20	111,437 03	145,899 61	163,097 46	178,186 97
Prince Edward Island.....						
British Columbia.....						
Department.....						
Examination of Masters & Mates.....	4,381 04	4,117 83	4,255 24	6,363 88	4,116 99	3,745 33
Hudson's Bay Expedition.....						
Investigation into wrecks.....	516 07	888 94	1,172 77	603 21	643 49	850 81
Marine Hospital, Quebec.....	18,643 14	10,279 08	751 75			
Marine Hospitals.....	33,689 20	31,450 03	33,303 37	34,106 83	35,757 07	38,403 94
Meteorological Service.....	58,577 07	58,462 10	62,457 10	67,138 06	64,165 60	66,440 96
Registration of Canadian Shipping.....	179 21	647 52	1,207 07	462 59	1,476 19	394 00
Removal of obstruction.....	3,603 65	5,737 26	3,633 65	2,878 68	1,554 53	202 02
Rewards for saving life.....	5,503 44	8,150 92	4,952 20	6,398 93	7,432 64	8,014 67
Signal Service.....	5,092 54	4,976 80	4,700 79	5,014 42	5,040 58	4,668 93
Steamboat Inspection.....	22,313 03	20,989 52	22,183 76	22,736 59	24,386 96	25,961 36
Survey, Georgian Bay and Hydro. surveys.....	17,808 46	17,969 23	17,677 51	16,451 10	17,542 11	31,461 76
Water Police, Montreal.....	16,948 82	13,167 00	573 80			
do Quebec.....	14,698 68	8,620 61	7,279 85	6,161 60	5,436 23	
Civil Government.....	43,501 96	42,835 78	43,253 67	43,195 31	56,477 21	54,988 88
Steam Communication—						
Between Prince Edward Island and Mainland.....	143,505 60					
Repairs to wharves.....					84 90	1,007 65
Purchase of str. to replace—						
“Glendon”.....						
“Lady Head”.....						
Winter Mail Service, P.E.I.....	1,842 47	2,752 67	7,012 70	3,309 44	4,376 96	6,497 03
Tidal Observations.....		244 75	1,888 71	711 59	5,099 17	10,172 61
Gratuities.....	200 00	80 00	1,025 00			3,261 32
Survey, Burrard Inlet.....			1,690 12	2,580 45		
Export Cattle Trade.....			520 85	1,411 57	1,711 73	1,350 83
Survey, Bay of Quinté.....					2,085 45	
	1,023,801 34	807,417 53	885,410 11	861,426 80	898,720 03	905,654 34

APPENDIX No. 17.

COMPARATIVE STATEMENT of Lighthouses, &c., and Steamers of the Marine Branch maintained in the respective Agencies, corrected up to 31st December, 1894.

District.	Light-stations.	Lights.	Keepers.	Light-ships.	Fog-whistles.	Fog-horns.	Fog-bells.	Fog-guns or bombs.	Whistling buoys.	Bell-buoys.	Gas buoys.	Steamers.	Total expenditure for each Agency.	Salaries paid in the Agencies.	Number of Persons employed in each Agency.
Province of Ontario.	176	*	170	4	2	10	2			4					
Light-ships.	4	4											90,671 84		
Province of Quebec.	116	153	137	8	2	9		9			10 (4 with bells)	3	155,215 50	4,800	4—Agent, accountant and 2 clerks.
Light-ships.	8	8			3		1								
Province of Nova Scotia.	169	175	174	1	10	6	2	1	15	11		1	163,493 25	3,850	4—Agent, accountant, clerk, messenger.
Fog-alarms.	2	2													
Light-ships.	1	1													
Province of New Brunswick.	94	118	100	1	4	8		1	4	3		1	89,676 74	3,450	3—Agent, accountant, messenger.
Fog-alarms.	3	3													
Light-ships.	1	1													
Province of Prince Edward Island.	35	55	41			1			3	1		S.S.	45,351 04	1,400	1—Agent.
Provinces of British Columbia.	13	13	15		1	5	3			1		"Stanley"	54,324 87	1,920	2—Agent, messenger, and occasional clerical assistance.
Lighted buoys.	2	4													
	624	755	637	14	22	39	8	11	22	20		10			
	*	*													

*Light-ships and fog-alarms where there are no lights are in these two columns included in the total number of light stations and lights in the Dominion.

APPENDIX No. 18.

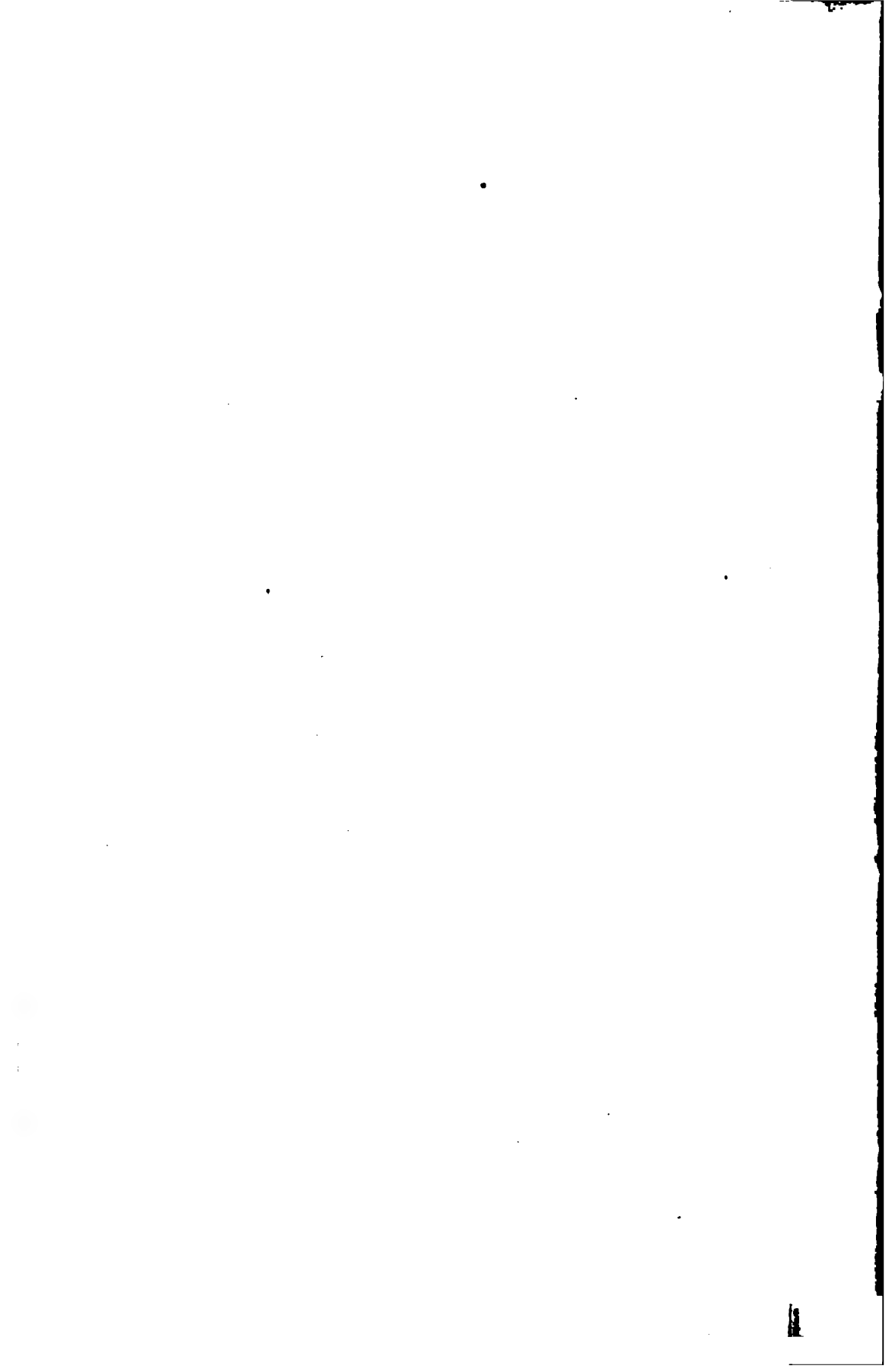
ICE BOAT MAIL SERVICE.

Mails transferred from steamer "Stanley" and first crossing made on the 17th January, 1894, when the mails were given to the steamer "Stanley" and route closed.

The ice was unusually rough and heavy falls of snow with scarcely any thaw made it necessary to increase the number of men to each boat from five (5) to six (6) for about 34 round trips or 68 crossings. The weight of mail matter was also largely in excess of former winters, and the men began to be completely fagged out, the extra man on each boat was found necessary during the whole of the latter part of the season.

The season's work is as follows :—

Crossings made from Traverse, west.....	57
do Tormentine, east.....	59
Male passengers carried on crossing.....	58
Female do do.....	7
Strap do do.....	48
Hauled do do.....	17
Extra baggage do.....	350 tons.
Number of mail bags do.....	3,576 bags.
Gross earnings.....	\$178 50







7-11-30
12-11-12
TWENTY-EIGHTH ANNUAL REPORT

1304
OF THE

DEPARTMENT OF MARINE AND FISHERIES

1895

MARINE

PRINTED BY ORDER OF PARLIAMENT



OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST
EXCELLENT MAJESTY
1896

Price 10 cents.

11-1896

MAHON, FREDERICK (1871-1961)

MAHON, FREDERICK

MAHON, FREDERICK

TWENTY-EIGHTH ANNUAL REPORT

OF THE

DEPARTMENT OF MARINE AND FISHERIES

1895

MARINE

PRINTED BY ORDER OF PARLIAMENT



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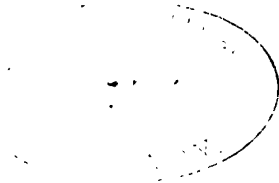
OTTAWA

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EXCELLENT MAJESTY

1896

[No. 11—1896.] *Price 10 cents.*

Can. Soc. 10. 62. 5



From
Hon. J. G. Bourinot,

*To His Excellency the Right Honourable SIR JOHN CAMPBELL HAMILTON-GORDON, EARL
OF ABERDEEN, Governor General of Canada, etc., etc.*

MAY IT PLEASE YOUR EXCELLENCY :

I have the honour to submit herewith, for the information of Your Excellency and the Legislature of Canada, the Twenty-Eighth Annual Report of the Department of Marine and Fisheries, Marine Branch.

I have the honour to be,

Your Excellency's most obedient servant,

JOHN COSTIGAN,

Minister of Marine and Fisheries.

DEPARTMENT OF MARINE AND FISHERIES,

OTTAWA, 31st December, 1895.

CONTENTS

	PAGE.
Report submitted by Minister.....	1
Report of Deputy Minister.....	1

SUBJECTS EMBRACED IN DEPUTY MINISTER'S REPORT.

Buoys and Beacons.....	47
Coasting Trade of Canada.....	63
Dominion Steamers.....	48
Engineers' Certificates.....	59
Ice Boat Mail Service.....	53
Inside Service Employees.....	61
Lighthouse Service.....	1
do Ontario Division.....	2
do Quebec Division.....	11
do Nova Scotia Division.....	18
do New Brunswick Division.....	29
do Prince Edward Island Division.....	41
do British Columbia Division.....	44
Legislation.....	65
Longitude of Montreal.....	59
Live Stock, Inspection of.....	64
Maintaining Lighthouses and Dominion Steamers.....	52
Merchant Shipping.....	58
Masters' and Mates' Certificates.....	53
Meteorological Service.....	63
Magnetic Observatories.....	63
Messenger Pigeons.....	64
Oils for use of Lighthouses.....	47
Outside Service Employees.....	62
Obstructions to Navigation, removal of.....	65
Sick and Distressed Mariners.....	55
Steamboat Inspection.....	59
Wrecks and Casualties.....	55

APPENDICES

Expenditure, Statement of, for 1894-95.....	67
Expenditure since confederation.....	152
Hydrographic Work, Chief Engineer's Report.....	70
Live Stock Shipments.....	118
Life-boat Stations.....	143
Legislation, Act Amended.....	151
Lighthouses, Stations, etc., and Agencies.....	156
Masters and Mates, Report of Chairman of Board of Examiners.....	140
Meteorological Service.....	93
Messenger Pigeon Service.....	138
Revenue Statement.....	69
Rewards for Humane Service.....	148
Steamboat Inspection, Report of Chairman.....	111
Signal Service.....	131
Sick Mariners' Dues.....	150
Wharfs, Statement relating to.....	128
Wrecks and Casualties.....	157

ALPHABETICAL INDEX

A.

	PAGE
Aids to Navigation, New	2, 12, 18, 29, 42, 44
Amherst Island—Repairs	13
Anticosti, East Point—Repairs	13
do South-west Point—Repairs	13
do West Point do	13
Amet Island do	22
Argyle do	22
Anderson's Hollow do	31
Alford Reef Buoy do	46
"Aberdeen"	50
"Alert"	51

B.

Burlington Beach—Improvements	10
Belle Isle—Repairs	13
Bicquet do	13
Bird Rocks do	14
Buoy Service, Ontario	17
Burret Ledge Gas Buoy	17
Beaujeu Bank do	18
Beaver Island—Repairs	20
Beaver Harbour, Nova Scotia—Repairs	20
Black Rock—Repairs	23
Buoy Service, Nova Scotia—Coast Buoys	23
Blonde Rock Automatic Buoy	25
Beaver Harbour, N.B.—Repairs	31
Belle Isle Public Landing—Repairs	31
Big Duck Island—Repairs	32
Bliss Island do	32
Bridges Point do	32
Black Point Automatic Buoy	38
Belle Isle Buoys	39
Buctouche do	39
Beaver Harbour Buoys	39
Baie Verte do	39
Block House Point Light—Repairs	44
Brighton Beach do	44
British Columbia Lighthouse Division	44
Beren's Island New light	44
Balfour	44
Buoys and Beacons—General	47

C.

Cabot Head Light and Fog Alarm	3
Changes and improvements at existing stations	8
Cape Bauld—Repairs	14
Cape Charles do	14
Cape Despair do	14
Cape Gaspé do	14
Cape Norman do	14

C—Concluded.

	PAGE
Cape Ray —Repairs.....	14
Cape Rosier do	14
Cape Salmon do	14
Champlain do	14
Crane Island do	14
Cow Bay Light discontinued.....	19
Canso Harbour—Repairs.....	21
Cape La Ronde do	21
Cape George do	22
Cape North do	22
Cape Fourchu do	23
Cape Race—Fog Alarm.....	28
Cranberry Head do	28
Cross Island do	28
Cape Sable do	28
Cape d'Or do	29
Cape Jourimain Light—Repairs	32
Cape Spencer do	32
Caraquet do	32
Cape Tormentine Buoys.....	38
Chebogue Ledge—Buoy	39
Cardigan River Light—Repairs.....	43
Cape Bear do	43
Crapaud Inner do	43
Cape Beale—Repairs.....	46
Carmanah do	46
Coasting Trade of Canada.....	63
Correspondence.....	65

D.

Dalhousie Light—Repairs	32
do Buoys.....	39
Dipper Harbour Buoys.....	40
Discovery Island Light—Repairs	47
Dominion Steamers	48
do do Statement of expenditure for maintenance and repairs, 1895	52
"Druid".....	51
Dominion Steamers and Lighthouses—Cost of maintaining.....	52

E.

Eboulement—Repairs	14
Egg Island, Quebec—Repairs.....	14
Explosives at Fog Alarms, &c.....	16
Egg Island, Nova Scotia—Repairs.....	20
Eddy Point—Repairs.....	21
East Point do	43

F.

Fog Alarms in Nova Scotia.....	28
Fanjoy's Point—Repairs	32
Fort Jolly Point Light—Repairs.....	33
French Lake Buoys	40
Fiagard	46

G.

	PAGE
General Repairs.....	10
do Statement of expenditure.....	11
Greenly Island Improvements.....	12
Gillis Point Lighthouse—Repairs.....	18-22
Guyon Island—Repairs.....	21
Gull Rock do.....	22
Great Bras d'Or—Additional buoys.....	24
Gage Town—New light.....	29
Gannet Rock Light—Repairs.....	33
Goose Lake do.....	33
Grand Manan Fog Alarm—Repairs.....	33
Green Head Light—Repairs.....	33
Grindstone Fog Alarm.....	33
Gallows' Point Beacon.....	45

H.

Hodgson Reef Buoy.....	46
------------------------	----

I.

Improvements and changes at Existing Stations.....	8
Isle Perrot.....	8
Improvements to Lights.....	13
Isle à la Bague—Repairs.....	14
Isle St. Thérèse do.....	14
Isaac's Harbour do.....	21
Ingonish Harbour do.....	22
Isaac's Harbour—Automatic Buoy.....	24
Ice Boat Mail Service.....	53
Inland and Coasting Certificates.....	54
Inside Service.....	61

J.

Jeddore—Repairs.....	20
Jerseyman Island—Repairs.....	21
John's Ledge—Bell Buoy.....	25
Jemseg—Buoys.....	40

K.

Kingsville—Improvement.....	10
Kaministiquia—Range lights.....	10
Kamouraska—Repairs.....	15

L.

Lighthouse Service.....	1
Lake of the Woods—Lights and Buoys.....	6
Lark Islet—Repairs.....	15
Lower Traverse—Lightship repairs.....	15
Lights Discontinued N. S. Division.....	19
Liscomb—Repairs.....	21
Louisbourg do.....	21
Lighthouse Bank—Can Buoy.....	23
Louisbourg—Bell Buoy.....	24
Lunenburg—Automatic Buoy.....	24
Lurcher do.....	25

L—Concluded.

	PAGE
Life Boat Stations.....	28
Letête—Fog Alarm repairs.....	33
Little Shippegan—Buoys.....	40
Lighthouses and Dominion Steamers—Cost of Maintaining.....	52
Longitude of Montreal.....	59
Live Stock—Inspection of.....	64
Legislation.....	65

M.

Macquereau Point—Repairs.....	15
Matane do.....	15
Montée du lac do.....	15
Maintenance of Lights in Quebec—Statement of minor Expenditure.....	16
Middle Ground—Gas Buoy.....	17
Murray Bay Buoy—Removal of.....	18
Meagher's Beach—Repairs.....	20
Merigomish do.....	22
Margaretsville do.....	23
Machias Seal Island do.....	33
Midjic Bluff Light do.....	34
Miscou Light and Alarm—Repairs.....	34
Middle Island Light do.....	34
Musquash River—Buoys.....	40
Miramichi do.....	40
Masters and Mates—Certificates to.....	53
Marine Hospitals.....	55
Merchant Shipping.....	58
Meteorological Service.....	63
Magnetic Observatories.....	63
Messenger Pigeons.....	64

N.

New Aids to Navigation.....	2
New Lights Established.....	12
Nova Scotia—Lighthouse Division.....	18
New Lights, N.S. do.....	18
North-east Shoal—Whistle Buoy.....	23
North-west Ledge—Bell Buoy.....	25
New Brunswick—Lighthouse Division.....	29
Negro Town Point—Light repairs.....	34
Neguac do.....	34
North Tracadie do.....	34
North Cape, P. E. Island do.....	42
North Rustico do do.....	43
" Newfield ".....	48

O.

Ontario—Lighthouse Division.....	2
Owen Sound—Improvements.....	9
Oakville do.....	9
Old Woman Ledge—Bell Buoy.....	24
Old Man—Can Buoy.....	25
Oromocto—New light.....	30
Oil for Lighthouses.....	47
Outside Service.....	62
Obstructions to Navigation, Removal of.....	65

P.

	PAGE
Pine Tree Harbour—Range lights	3
Pie Island—Lighthouse	5
Point Pelée—Spit	8
Percé—Repairs	15
Plateau Rock—Repairs	15
Port St. Francis do	15
Pillars do	15
Pope's Harbour do	20
Petit-de-Grat do	21
Port George do	23
Port Williams do	23
Pease Ledge—Can Buoy	26
Partridge Island—Fog Alarm repairs	35-39
Passamaquoddy Bay—Light do	35
Pea Point—Light do	36
Point Lepreaux—Fog Alarm do	36-40
do Light do	36
Portage Island do do	36
Preston Beach do do	37
Point Lepreaux—Buoys	40
Prince Edward Island—Lighthouse Division	41
Portlock Point	45

Q.

Quebec—Lighthouse Division	11
Quaco—Fog Alarm repairs	37
do Buoys	41
"Quadra"	50

R.

Red River—Range lights	7
Repairs at Existing Stations	13
Red Island Lighthouse—Repairs	19
do Lightship do	1
do N.S.—New light	19
Roaring Bull—Can Buoy	26
Railway Wharf and Moffat's Landing—Repairs	37
Richibucto—South Beach repairs	37
do Head Light do	37
Race Rocks	46

S.

Sault Ste. Marie Canal and Approaches	4
Sheet Rock—Repairs	20
Scattarie do	22-29
Sambro do	22
Spry Bay—Bell Buoy	23
Sisters do	24
Sable Island	27
do Rules for patrolling	27
St. Paul's Island	28
Shelburne—Fog Alarm	28
Shediac, North Channel—Range Light	30
do Island do	31
St. John Beacon—Light Repairs	31
Sand Point do	37

S—Concluded.

	PAGE
South Tracadie, N.B.—Lights Repairs	37
South-west Head Light do	38
Swallow Tail do do	38
Southern Wolf—Automatic Buoy	41
Split Rock do	41
Summerside—New light	42
Sandy Island—Repairs	42
St. Andrew's Point—Repairs	43
Sea Cow Head—Light repairs	43
Sand Head—Beacon	45
Sturgeon Bank—North Beacon	45
Shrub Island—Beacon	46
"Stanley"	49
Sick and Distressed Mariners	55
Steamboat Inspection and certificates to Engineers	59

T.

Toronto East Gap Light	2
Three Top Island—Repairs	21
Trinity Shoal—Bell Buoy	26
Tignish River—Repairs	43

U.

Upper Traverse—Lightship repairs	15
Uniacke Point	19

W.

Western Islands—Lighthouse and Fog Alarm	3
White Island Reef—Lightship Repairs	16
Wolf Point Lighthouse	19
Wedge Island—Repairs	21
Williams' Landing—Repairs	38
Wood Island do	43
Wrecks and Casualties	55

Y.

Yarmouth, South-west—Automatic Buoy	26
do Fairway—Bell Buoy	26
do North-west—Automatic Buoy	27
do Fog Alarm	29

Z.

Zephyr Rock Buoy	38
------------------------	----

APPENDICES.

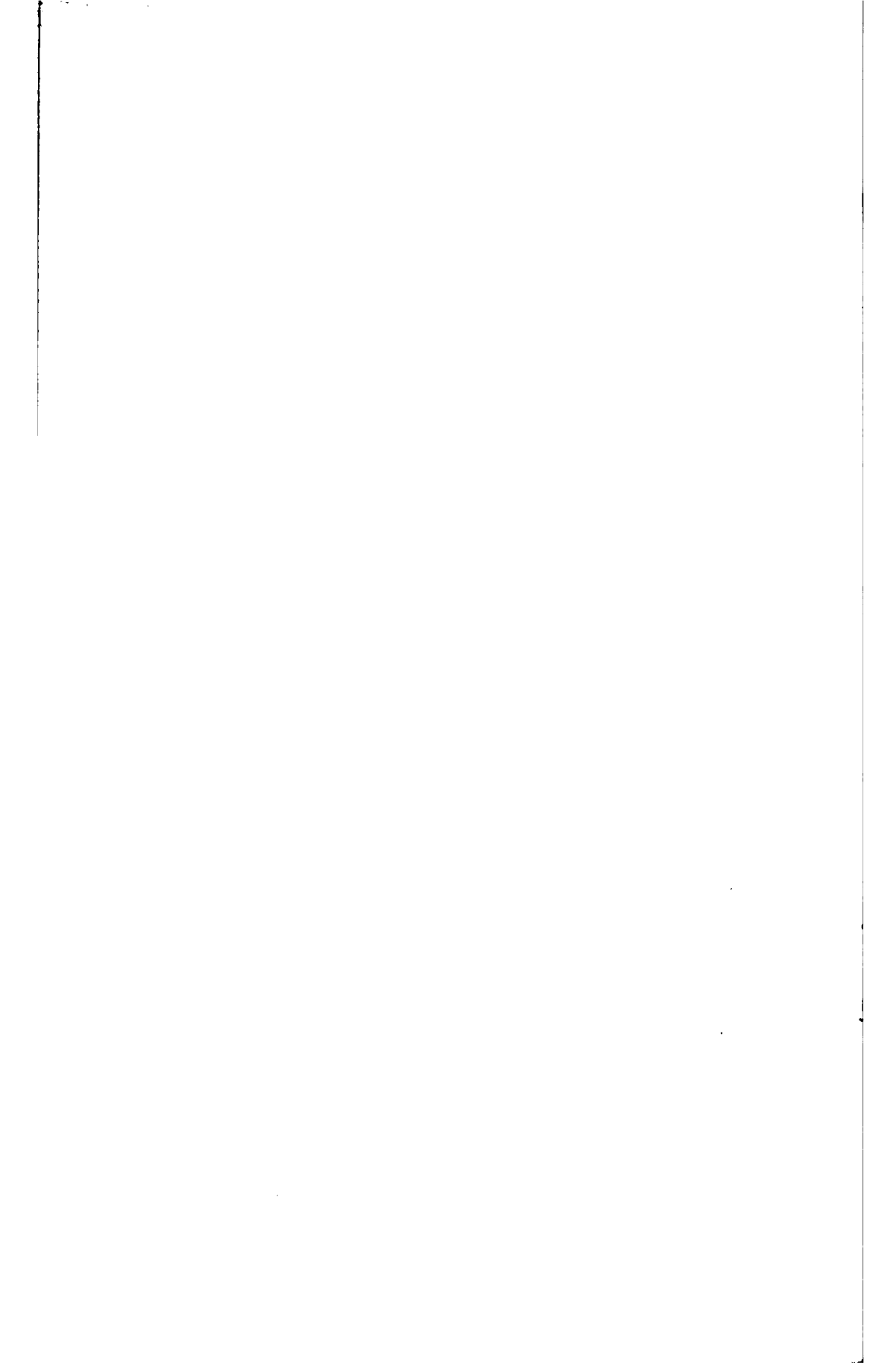
B.		PAGE.
Board of Examiners of Masters and Mates, Report of Chairman.....		140
E.		
Expenditure, statement of, 1895		67
do from Confederation to 30th June, 1895.....		152
H.		
Hydrographic work, Chief Engineer's Report		70
J. Stewart, Report of Progress—Surveys of Lake Erie.....		72
Survey of Tides and Currents, W. B. Dawson.....		74
L.		
Live Stock Shipments.....		118
Record of, shipped from Montreal, 1895.....		118
do Halifax in 1895		118
do Quebec		127
Life Boat Stations, Report of Alfred Ogden on efficiency.....		143
do Statement of.....		146
Lighthouses, &c., and Steamers of Marine Branch maintained in respective agencies to 1895.....		156
Legislation, Act amended.....		151
M.		
Meteorological Service		93
Storm Signal Service.....		95
Weather forecasts.....		96
Predictions.....		98
Inspector's Reports		101
Magnetic Observatory.....		107
Time Service		107
Quebec Observatory.....		109
St. John do		109
McGill College Observatory.....		110
Masters and Mates, Report of Chairman of Board of Examiners.....		140
Messenger Pigeon Service.....		138
Report of H. V. Kent, R. E., Supt. Signals.....		138
R.		
Revenue, statement of.....		69
Rewards for Humane Service.....		148
S.		
Steamboat Inspection		
Chairman's Report.....		111
Montreal Division.....		114
Quebec do		114

S—*Concluded.*

	PAGE
Steamboat Inspection— <i>Concluded.</i>	
Maritime Provinces Division.....	114
British Columbia do	114
Manitoba and Keewatin Division.....	115
Prosecutions for Violation of Act.....	115
Signal Service, Report of H. J. McHugh	131
do Telegraph and Semaphore.....	136
Sick Mariners' Dues collected.....	150

W.

Wharfs, statement relating to.....	128
Wrecks and Casualties.....	157



REPORT OF THE DEPUTY MINISTER.

To the Honourable

JOHN COSTIGAN,

Minister of Marine and Fisheries.

SIR,—I have the honour to report on the transactions of the Marine Branch of this department for the fiscal year ended 30th June last, and to give an account of a portion of the business up to date.

In the appendices to this report will be found reports from the Chairman of the Board of Steamboat Inspection; Chairman of Board of Examiners of Masters and Mates, the reports from the Chief Engineer, the Inspectors of live stock shipments, the Director of the Meteorological and Magnetic service, the Inspector of Signal service, and reports on the life-boat stations, messenger pigeon service, rewards for humane service, together with statements of revenue, expenditure, sick mariners' dues, wharfage and wrecks and casualties.

The total amount expended on the various branches of the public service comprised in this department during the fiscal year ended 30th June, last was \$824,488.46. The salaries of the established staff, including Marine and Fisheries, amounted to \$54,992.50.

The total amount voted by Parliament was \$901,285.00, not including the departmental salaries. It will thus be seen that during the fiscal year the expenditure was \$76,796.54 less than the amount voted by Parliament.

The whole number of persons in the outside service of the Marine Branch at the date of the report is 1,679.

During the past fiscal year the expenditure for maintenance of lighthouse and coast service amounted to \$463,683.93, and for construction of lights \$12,219.29; total for maintenance and construction, \$475,903.22, while for the previous year the expenditure for lighthouse and coast service, including construction, was \$476,225.85, showing a decrease of expenditure for the year ending 30th June last, of \$322.63. The appropriation for this service was \$525,720.00, the expenditure being \$49,816.78 less than the appropriation of Parliament for the fiscal year.

LIGHTHOUSE SERVICE.

The lighthouse service of the Dominion is divided as follows:—The Ontario division, embracing all lights from Montreal westward to the North-west Territories; the Quebec division, extending below Montreal and including the River and Gulf of St. Lawrence and Strait of Belle Isle; the Nova Scotia division, including St. Paul's Island, Cape Breton, Sable Island and Cape Race, Newfoundland; the New Brunswick division, the Prince Edward Island division, and the British Columbia division, each including lights within the provincial boundaries. The total number of light stations, light-ships and fog-alarm stations in the Dominion on the 30th of June, 1895, was 632, and of lights shown, 768, the number of steam-whistles and

fog-horns, 81; the number of light-keepers and engineers of fog-alarms with masters of lightships, was 710. Appendix No. 16 contains the number of stations, lights, fog-alarms and steamers in each agency in detail.

ONTARIO LIGHTHOUSE DIVISION.

This division includes the lighthouses and other aids to navigation in that part of the province of Quebec lying west of Montreal, all the lights in the province of Ontario, lights above Montreal, embracing the lights on the Ottawa River, the Great Lakes, and some of the smaller inland lakes, as well as the lights on Lake Winnipeg, in the province of Manitoba.

The number of lighthouses, lighted beacons and lightships maintained by the Dominion in the Ontario division, as above described, is 224, located at 182 different stations.

The number of light-keepers in this division paid directly by the government, is 172, but in several cases assistants are employed by keepers, and paid by them out of the allowance made by the government for that purpose.

There are in Ontario, two fog-whistles, eleven steam fog-horns, and three fog-bells, all located at light stations, as well as four bell-buoys.

Besides the lights maintained by this department, as above described, there are in Ontario the following aids to navigation: two lights on swing bridges; a system of lights on the Murray Canal, maintained by the Department of Railways and Canals; four pairs of range lights on the Detroit and St. Clair Rivers, maintained by the American vessel owners principally interested; thirteen wharf lights maintained by the municipalities or corporations to which the wharfs belong, and two range lights established this year at Pine Tree harbour.

Eight of these last described stations are aided by this department to the extent of being furnished with the necessary oil for their maintainance.

The lights in this division, with the exception of those on the Bay of Quinté, the Ottawa River, and the small lakes, were inspected during the months of July and August, by Mr. Patrick Harty, Superintendent of Lights, and supplied with the necessary stores for annual maintenance. It was found impossible, this season, to make a regular inspection of the lights in the Ottawa River.

NEW AIDS TO NAVIGATION.

Toronto East Gap Light.

For some years past, extensive work has been performed by the Department of Public Works in dredging a deep channel through the East Gap or eastern entrance to Toronto harbour, Lake Ontario, and in protecting this channel by breakwater piers of cribwork. This department proposes to mark the new channel, when completed, by a system of leading lights. In consequence of the low water which prevailed in the lake this summer, steamers preferred using this channel, although not completed, to the west entrance, and urged the early establishment of a light. A temporary light was consequently put in operation on the 9th September last; it is a fixed red light, elevated 16 feet above the water, and visible 6 miles from all points of approach. The illuminating apparatus is a dioptric lens of the seventh

order. The galvanized iron building from which the light is shown is an experimental one, designed by Messrs. Noah L. Piper & Son, of Toronto and was furnished the department at a cost of \$140. The lantern is hoisted in a cylindrical column surmounting a hexagonal shed which stands 100 feet from the outer end of the east breakwater pier. It is hoped that lights of a more permanent character will be established next year.

Pine Tree Harbour, Range Lights.

On representations made by parties interested in shipping from Pine Tree Harbour, on the west coast of North Bruce, Lake Huron, two headlight lanterns with accessories, were provided by this department, at a cost of \$54.50, and two range lights were, in July last, put in operation by private enterprise, to lead into the harbour, and will hereafter be regularly maintained. The poles on which the lanterns are hoisted, and the cost of maintenance are provided by the shipping interested, the government only supplying oil.

Cabot Headlight and Fog-alarm.

The construction of a lighthouse and fog-alarm on Cabot Head, on the eastern coast of Georgian Bay, has been undertaken. This station will be a very important one, as Cabot Head is the principal point of departure for all vessels entering Georgian Bay and bound for ports south of Parry Sound, including Midland, Collingwood and Owen Sound. It will also mark Wingfield Basin, which, when the entrance is properly dredged, will make an important harbour of refuge. The contract for the necessary buildings has been awarded to Mr. John George of Port Elgin, for \$3,475, and construction is now in progress. The fog-alarm boilers and machinery have been made by Messrs. Carrier, Lainé & Co., of Lévis, and the iron lantern and illuminating apparatus by the Chanteloup Manufacturing Co., of Montreal.

Western Islands Lighthouse and Fog-alarms.

The Western Islands, off the Eastern coast of the Georgian Bay, have always been a menace to navigation, as they are on the route from Collingwood to Parry Sound, and on the route from the gap to Midland Bay, a route greatly used by grain vessels in the stormy nights towards the close of navigation. It was therefore considered desirable to mark them by a light and fog-alarm, which have been erected on Double Top Rock, at the south-western extremity of the group of islands, and which were put in operation on the 24th October, 1895. In consequence of the exposed location of these islands, it was necessary to erect buildings capable of resisting heavy spray.

The lighthouse tower stands on the south-west part of the rock. It is an octagonal wooden building with sloping sides and is painted white. It is surmounted by an iron lantern painted red. The height of the building from the rock to the vane on the lantern is 59 feet.

The light is fixed white, elevated 74 feet above the level of the bay, and should be visible 14 miles from all points of approach. The illuminating apparatus is temporarily dioptric of the seventh order, but it is intended to replace this by a more powerful apparatus.

The fog-alarm building stands on the west extremity of the rock, N.N.W. 80 feet from the lighthouse. It is a square wooden building painted white, with the duplicate horns issuing from the west face.

The fog-alarm consists of a horn operated by steam and compressed air, which gives blasts of 8 seconds' duration, with intervals of 40 seconds between the blasts. The machinery is in duplicate, so that in case of a horn or boiler becoming inoperative, the other can be used.

The buildings were constructed by Messrs. Reed & Green, of Owen Sound, whose contract price was \$4,788. The fog-alarm boilers and machinery were made by Messrs. Carrier, Lainé & Co., of Lévis, at a cost of \$2,400, and were set up by Mr. W. H. Noble; the lighthouse lantern was made by the Chanteloup Manufacturing Company of Montreal. The total expenditure on the installation of this station, up to date, has been \$8,393.28.

Canadian Canal at Sault Ste. Marie and Approaches.

The ship canal constructed by the Canadian Government on the north side of Sault Ste. Marie, to connect the navigable waters of the upper River St. Mary and Lake Superior with those of the lower River St. Mary and Lake Huron, was opened to general traffic on the 9th instant, and will be kept in operation hereafter while navigation is open.

In connection with the opening of the canal, the Chief Engineer of this department visited Sault Ste. Marie and completed arrangements for lighting and buoying the approaches.

Location and Dimensions of Canal.—The canal is cut through red sandstone rock on the north or Canadian side of Sault Ste. Marie, about 4,000 feet north of the existing United States canal. The cut is straight and is 5,900 feet long between the extremities of the cribwork approaches. The canal prism is 156 feet in width at the surface, 143 feet at the bottom, and the water is 22 feet 3 inches deep. There is one lock, which is 900 feet long by 60 feet wide, with a depth on the mitre sill of 20 feet 3 inches. The lift is about 18 feet, varying somewhat as the waters above or below the canal are affected by drought, rain, wind, etc. Outside the canal, at each end, a channel 18 feet deep by 250 feet wide has been dredged, connecting with the American channels.

Buoys.—The approaches are marked by spar buoys. The dredged channel east of the canal is indicated by 8 red and 4 black spar buoys. The lowest red spar buoy, near Plummer's dock, is distinguished by being surmounted by a slatwork cone, and the lowest black spar buoy, opposite the International dock, is surmounted by a slatwork drum. Below this easternmost black buoy there is at least 15 ft. of water across to the wharf on the American side of the river, and vessels desiring to cross the river need not keep close to the red buoys any farther east. Above the canal there is an octagonal timber crib surmounted by a day beacon built on the starboard side of the channel off Davignon Point, to mark the only turn above the canal. There are two red buoys between the end of the canal embankment and this beacon. There is a black buoy on the south side of the same stretch, and two black buoys to mark the turn opposite the beacon. Off Vidal shoal there are four red buoys. The outermost of these buoys is a square platform buoy on which stands a pyramidal slatwork surmounted by an inverted cone. On the port side of

the channel are four black spar buoys. The platform buoy indicates a point where vessels upwards bound can leave the dredged channel and make a course for Algoma Park light, and where vessels bound down require to take Canadian dredged channel.

Lights.—It is intended to mark the dredged channel approaching the canal from the eastward by two electric arc lights shaded by red globes, placed in a prolongation of the axis of the dredged cut. These two lights in line will lead vessels from the American channel up the middle of the dredged approach to the east end of the canal. Further details of these lights will be given when established.

The canal itself is marked by white electric arc lights established at regular intervals along both sides of the canal bank and cribwork approaches.

A group of incandescent electric or white lights is to be placed on top of the beacon at the turn in the western approach to the canal, and an incandescent bright light on a pole is to be established on the eastern extremity of Davignon Point. These two lights in one, N.E. $\frac{1}{2}$ E., will guide from the turn at the beacon through the middle of the dredged channel, past Vidal shoal, to the American channel. Further particulars of these lights will be given when established.

Sailing Directions.—Vessels bound upwards should keep the usual course in making for the American canal until they bring the Canadian range lights below the canal in one bearing N.W. $\frac{1}{2}$ N. They should then follow the alignment of these lights, between the red and black buoys, until they reach the axis of the canal, due west. They moor to the cribwork at the north side of the entrance while waiting to go through the lock; after passing through the lock and the upper end of the canal, their course will be W. $\frac{3}{4}$ S., passing 125 feet south of the beacon. On reaching the beacon they haul S.W. $\frac{1}{2}$ W. and rounding the westernmost of the two black buoys and keeping the range lights in one astern, pass up through the middle of the channel between the red and black buoys. After passing the red pyramidal buoy off the west extremity of Vidal shoal there is good water up to Algoma Park light and vessels can make for that light.

Hay Lake Channel.—In connection with the opening of the canal, it may be mentioned that the American government greatly improved the approach to it from the eastward by opening Hay Lake channel last year. It is cut, principally in American waters, south of Sugar Island, through Sugar Island rapids and Middle Neebish. It leaves the present channel of River St. Mary about $2\frac{1}{2}$ miles below the canal, rejoining it at the foot of Sugar Island and shortens the distance to Lake Huron by several miles. This channel is now properly buoyed, and on the 5th of October last was further marked by a system of 27 lights established by the United States Government.

Pie Island lighthouse.

A new light was put in operation on the 15th September last, on the west extremity of Pie Island, at the western entrance to Thunder Bay, Lake Superior, District of Algoma.

The light is a fixed white light, elevated 29 feet above the level of the lake, and should be visible 10 miles from all points of approach by water. The illuminating apparatus is dioptric of the seventh order.

The light building is a small wooden tower, square in plan, painted white, surmounted by a square wooden lantern, painted red. The height of the building, from its base to the vane on the lantern, is 23 feet.

The tower stands upon the rocky shore of the island upon the extremity of the point adjacent to and south of the wharf on Pie Island. The wharf extends about 500 feet in a north-westerly direction at right angles to the shore line, and is distant about 400 feet north-east of the lighthouse. The light is intended to guide through the inside channel west of Pie Island, and will also indicate the position of the wharf.

The building was erected under contract by Mr. A. W. Daby, of Pie Island, for \$325. The total expenditure in connection with the establishment of this light was \$441.27.

Lake of the Woods Lights and Buoys.

In consequence of complaints from the shipping interests, the Chief Engineer of the department made an inspection of Lake of the Woods light and buoy service in September, 1894, and reported considerable improvements desirable in view of the extensive steamboat traffic in connection with lumber and fishing interests, as well as settlement and mining on Rainy River. A lighthouse had been maintained at the mouth of that river since 1836, but was found to be too far inland to be a safe guide in entering the river. During the past summer it was, consequently, removed from its old location on the main land on the Hungry Hall Indian Reserve, and placed on a pile foundation on the port side of the steamboat channel, off the south extreme of Sable island, lying in Lake of the Woods, outside the mouth of Rainy River, a distance of $2\frac{1}{2}$ miles N. $\frac{3}{4}$ E. from its former position.

The tower stands about 200 feet from the sand point running south from Sable Island; it is placed in about six feet of water, on a pile foundation. The height from the water to the tower sills is six feet, and from the sills to the top of the lantern, 30 feet. A shelter shed for the keeper stands near the south end of Sable Island.

The light is a fixed white light, elevated 32 feet above the level of the lake, and should be visible 10 miles from all points of approach by water. The illuminating apparatus is dioptric of the seventh order. The light in its new position was put in operation for the first time on or about the 10th September.

A pole light was at the same time established about $\frac{1}{2}$ mile S. E. by S. $\frac{3}{4}$ S. from the above described light. It is located on a pile foundation in about six feet water in a reed bed off the main land. The piles rise six feet above the lake, and support a mast on which the lantern is hoisted. The height from the piles to the top of the mast is 25 feet.

The light is a fixed red, shown from a seventh order dioptric lantern hoisted to the top of the mast. It is elevated 28 feet above water and should be visible 7 miles in, and over a small arc on each side of the line of range.

The two lights in one, bearing S. E. by S. $\frac{3}{4}$ S. lead up Lake of the Woods from Sugar Point to the mouth of Rainy river, between the middle ground shoal on the starboard hand, and Sable Island shoal on the port hand. Before reaching the front light, vessels must haul sharply S. W. $\frac{1}{2}$ W., from which point the channel into the river is marked by buoys.

The lighthouse was removed, and the extra buildings erected, by Mr. Chas. Cole, of Norman, whose contract price was \$1,150.00. It was found desirable at the same time, to reorganize the buoy service on the lake, and a three-year contract has been entered into with Capt. F. W. Brydges, of Rat Portage, to maintain 144 buoys at a cost for the first year of \$2,000 for making and placing, with a cost of \$500 additional for each following year. A chart of the lake is in course of preparation.

Red River Range Lights.

The Red River of the north empties into Lake Winnipeg, Manitoba, by several mouths through a delta, and the best channel into the lake has from time to time varied from one mouth to another. In 1880 a lightship was established by this department outside the eastern mouth; a few years later the western mouth carried the best water. The lightship was removed to it and beached, the light being continued as if it were a shore light. In 1893 the eastern channel again became the deepest, and extensive dredging operations have since been carried on by the Public Works Department to improve the bar outside the river at this eastern mouth. In that year the lantern was removed from the lightship and established on a pole at this east channel. In consequence of a visit of inspection made by the chief engineer in August, 1894, it was determined to replace this temporary light by two range lights, which were accordingly erected and put in operation on the 2nd of September, 1895, when the temporary light was discontinued.

The back tower is built on a pile foundation in a hay marsh on the east side of the channel, 2,020 feet south 10° W. of the position of the temporary pole light above described.

The tower is a wooden building, square in plan, rising with a taper, and surmounted by a square wooden lantern. It is 47 feet high from the pile foundation to the vane on the lantern. The lantern and lantern base down to the cornice on the tower are painted red, the remainder of the tower is painted white, with a red stripe three feet wide, extending from top to foot of the tower upon the north side, or the side facing the channel.

The light is a fixed white catoptric light, elevated 46 feet above the summer level of the lake. It should be visible 12 miles from all points of approach by water.

The front range light tower is located on a pile foundation on the shoals on the west side of the channel, and is distant about 3,600 feet N. $1^{\circ} 15'$ W. from the back tower and is so placed that the line of range leads up the lake to a point midway between the two outermost pile beacons.

The tower is a wooden building, square in plan, tapering to the lantern, which is of wood and square. It is 27 feet high from its base to the vane on the lantern. In the lower portion the framework is left open; the upper portion is inclosed. The lantern is painted red and the remainder of the tower white with a red stripe three feet wide in the middle of the side facing the channel.

The light is a fixed white catoptric light, elevated 23 feet above the summer level of the lake. It should be visible in, and over a small arc on each side of, the line of range, ten miles. It should also be visible in the dredged channel and the mouth of the river.

The two lights in one, bearing N. $1^{\circ} 15'$ W., lead vessels, coming up the lake to enter Red River, to the dredged channel midway between the two outermost

beacons. The dredged channel is a curved one, and is marked by pile beacons on each side surmounted by barrels. After making the outermost beacons the range lights must be left on the starboard hand, and after passing the bend the channel leads midway between the two buildings.

CHANGES AND IMPROVEMENTS AT EXISTING STATIONS.

Isle Perrot.—The light on Madore's Point, or Pointe à Brusy, on the north shore of Isle Perrot, at the entrance to the Ottawa River, has proved so useful, especially to steamers towing barges, that it was found desirable to replace the pole light, maintained since a former tower was destroyed by fire, by a small inclosed wooden tower standing on an open framework base. This tower is 18 feet high and is painted white with a red roof. It stands on a rip-rap foundation just outside the shore line of the island.

The light shown from the new tower is fixed white with a red and green sector. It is elevated 16 feet above ordinary river level and should be visible across the channel which it is intended to define. The light is strengthened by a pressed glass lens.

Vessels coming up the river keep the north shore channel as indicated by buoys, until they open the white sector of the light when they bear for that light across the channel, until they pass the buoy indicating the south extremity of the shoals lying between Isle Perrot and the north shore; they then bear for the light on the pier at the south-eastern end of Ste. Anne dredged channel crib.

Before taking the channel crossing they will open the red sector of Isle Perrot light and will pass into the white sector only when abreast of the channel. If the green sector is opened it will indicate that the vessel is too far up the river for the channel crossing. Vessels going down the channel on the Isle Perrot shore will open the green sector first and should turn as soon as the white sector is open. The white sector, being very narrow, must be closely watched and the turns made promptly.

The tower was built under the direction of Mr. W. H. Noble, foreman of works, at a total expense of \$97.07. It was proposed to erect range lights at this place to lead across the crossing, but in consequence of difficulty in obtaining a suitable site, the system of sectors was arranged by Mr. Noble, and serves a good purpose.

Point Pelte Spit.—Much trouble has been experienced in protecting this important station from damage by waves and ice. The lighthouse and fog-alarm are built upon an octagonal pier, sunk 20 feet or more into a sand bar, whose surface is continually shifting. At times the bar comes to the surface, at other times there is deep water close up to the pier. When the sea comes from such a point that shoal water breaks the waves before they reach the pier, spray flies over the lantern, completely deluging the structure although over 80 feet high. When the steam fog alarm was established at this station in 1889, the whole of the cribwork pier above the water was replaced by concrete, built into an iron casing or shell fitted to the cribwork below water. The force of the sea and ice have continued to damage this

pier particularly about the water line, and continual vigilance and expense are required to keep the pier intact and safe. This year it was necessary to fit a broad steel band round the base of the iron casing, which had been partially split and ripped off. The extremely low water made it possible to carry this lower than could have been done in previous years. The work was done under Mr. W. H. Noble's supervision at a cost of \$546.56.

Owen Sound.—This important harbour, the eastern terminus of the Canadian Pacific Railway Company's line of steamers, has been improved both by the company and also the Government. In consequence of the approach having been widened and deepened, it was found necessary to move the range lights leading into the mouth of the river, and the opportunity was taken to greatly improve their character.

The back range tower was moved from the embankment on the west side of the entrance, and now serves as the front tower of the new range. It stands on a pile foundation, at the outermost angle of the sheet piling, on the east side of the mouth of Sydenham River, its middle 18 feet from the face of the pilework. It is a square wooden building, surmounted by a square iron lantern, and is 34 feet high from base to vane. It is painted white with a vertical red stripe on the north side, or side facing the channel.

The light is a fixed red light elevated 39 feet above the level of the water. It should be visible seven miles in, and over a small arc on each side of, the line of range. The illuminating apparatus is catoptric.

The back range light tower, which is new throughout, is located on a pile foundation 915 feet S. by W. $\frac{3}{4}$ W. from the front tower, or 225 feet north-eastwardly from the north-east corner of the Canadian Pacific Railway elevator.

It is a square wooden building, surmounted by a square wooden lantern, is 46 feet in height from its base to the vane on the lantern, and is painted white with a vertical red stripe on the north side, facing the line of range.

The light is a fixed red light elevated 46 feet above the level of the water, and should be visible eight miles in, and over a small arc on each side of, the line of range. The illuminating apparatus is catoptric.

The front tower of the old range, on a crib outside the river's mouth, is still standing, and marks a point where vessels entering should have the alignment of the new range, and head for the river midway between the breakwater piers. This is no longer lighted, and the pier will probably be removed to suit extension of dredging. The axis of the new range of lights is 10° farther to the westward than the old one, and leads up the west shore of the sound, clear of all obstructions, and is consequently a great improvement on the old arrangement. The change was made on the opening of navigation this year. The work of removal and building was done under contract by Mr. John Riely, of Owen Sound, for \$498.

Oakville.—The breakwater piers at Oakville, in Lake Ontario, are owned by the municipality and have of late years been seriously damaged by storms, and for the sake of protecting the government lighthouse it has been necessary from time to

time to move it shoreward. Last spring it was finally moved to the inner end of the pier. In this position it is not so good a guide to vessels as in its former location at the outer end of the pier, but until the pier is repaired and the foundation protected it will be unsafe to have it maintained in the more exposed position.

Burlington Beach.—An agreement has been made between the Department of the Interior and the city of Hamilton whereby the Parks Committee of that municipality obtain control of certain portions of the Government reserve at Burlington Beach. The lots of land on which the lighthouse and keeper's dwelling stand have however been set aside and permanently reserved for the use of this department and fenced in at a cost of \$57.74, and the surroundings of the lighthouse have been improved by the removal of several unauthorized and unsightly buildings.

Kingsville.—On the opening of navigation last year, the front range light maintained on the outer end of the east breakwater pier at Kingsville, on the north shore of Lake Erie, was improved by substituting a seventh order dioptric lantern for the pressed glass lens lantern hitherto used. The light remains as heretofore fixed red but is greater in power. The lantern was procured from Messrs. Chance Bros' Lighthouse Works, England, at an approximate cost of \$100. A new mast fitted up by the keeper on which the lantern could be hoisted cost \$30.15.

Kaministiquia Range Lights.—As indicated in last year's report, the range lights at the north of River Kaministiquia, Thunder Bay, at the western terminus of the Canada Pacific Railway Co.'s lake steamers, were each increased in height 10 feet.

The back tower, with dwelling attached, is now 40 feet high to the vane on the lantern, and is painted white, with the square wooden lantern surmounting it painted red.

The front tower is a square wooden building painted white, surmounted by a square wooden lantern painted red, and is 30 feet high.

The lights are respectively 40 and 30 feet above the level of Thunder Bay, and should be visible 11 and 10 miles respectively in, and over a small arc on each side of, the line of range.

At the same time some repairs were made to the station, the whole at a cost of \$236. Last spring it was found necessary to protect the foundation of the front light building in consequence of scour by freshets, at a cost of \$47.25, the work being done under the superintendence of the lightkeeper. An expenditure of \$45.25 has also been authorized on repairs to road and chimney.

GENERAL REPAIRS.

At the several stations in this district, whatever was required to keep the buildings in good order and properly painted was done. In many cases materials were supplied to the lightkeepers who performed the necessary labour themselves for making the repairs. Materials for painting are also delivered on the annual supply trip and the keepers are required to do the painting at their stations personally, being allowed, in the case of high towers, some assistance in reaching the more inaccessible portions of the work. Hereto appended is a list of expenditure in connec-

tion with the repairs at the several stations. Some items of less than \$10 each being omitted.

Station.	Description of Work.	Cost.
		\$ cts.
Aylmer Island.....	Inclosing lamp.....	38 21
Battle Island.....	Boat.....	32 00
Buckum's Point.....	Boat-house.....	23 00
Burnt Island.....	Shingling and plastering dwelling.....	43 72
Campbell's Island.....	Purchase of site.....	20 00
Caribou Island.....	New boat.....	66 00
Centre Brother.....	Enlarging and lining kitchen.....	25 00
Chantry Island.....	Materials to repair sheds.....	30 00
Clapperton Island.....	Boat.....	175 00
French River.....	Rebuilding front range light tower.....	20 00
Gananouque Narrows.....	New boat.....	28 00
do.....	75 cords stone and inspection.....	276 25
Gin Rock.....	Ceiling kitchen.....	39 00
Green Shoal.....	Reshingling and repairing store.....	16 79
Griffith Island.....	Lumber for a kitchen.....	27 67
Hope Island.....	Moving boat-house and addition to wharf.....	122 33
Isle Perrot.....	Boat.....	16 50
Kincardine.....	Replacing gravel in front of tower and new steps.....	24 45
Lachine Pier.....	New boat.....	18 00
Lightship No. 2.....	Repairing damage by collision.....	29 50
Lamb Island.....	Materials for new building.....	368 09
W. End Long Point.....	Repairs to kitchen.....	28 00
Middle Island.....	Boat.....	55 00
Morrison's Island.....	Boat.....	38 00
Fox Island.....	Boat.....	50 00
North Sister.....	Materials for reshingling dwelling.....	44 35
Nottawasaga Island.....	Whitewashing tower.....	50 00
do do.....	Lumber for repairs to pier.....	12 00
Point Clark.....	Painting and whitewashing.....	78 00
Point Pleasant.....	Repairing fence.....	19 73
Presqu'île Point.....	Stand for new apparatus.....	14 00
Presqu'île Range Lights.....	New roof to dwelling house.....	56 72
Rondeau.....	Repairing damage done by lightning.....	18 37
do.....	Repairs to dwelling.....	41 76
Salmon Point.....	Repairs to kitchen.....	24 55
Scotch Bonnet.....	New boat-house.....	217 42
St. Anicet Bar.....	Stone rip-rap and repairs, including increasing height of pier.....	439 15
Sulphur Island.....	Freight and stand for new illuminating apparatus.....	44 25
Tobermory.....	Boat.....	50 00

QUEBEC LIGHTHOUSE DIVISION.

The Quebec division covers river and coast service of over 1,200 miles, comprising all the lighthouses, buoys and beacons in the Richelieu River and Lake Memphremagog; all the lighthouses, lightships, gas buoys, wooden buoys and beacons, fog-alarms, bombs and cartridge fog-signals in the River St. Lawrence below Montreal, Saguenay River, north side of Baie des Chaleurs, Gulf of St. Lawrence, Strait of Belle Isle, north and west coasts of Newfoundland and Labrador. This division is under the control of J. U. Grogory, agent of the Department of Marine and Fisheries at Quebec.

The agent attends to any other duties required by the department for the marine and fisheries services, and is also shipping master, attends to the requirements of the British Board of Trade in connection with shipwrecks and distressed seamen, casualties at sea, and is receiver of wrecks, and supervisor of wharfingers in the province of Quebec.

His staff consists of Mr. L. A. Blanchet, accountant and deputy shipping master; Mr. Alphonse Hamel, clerk; Mr. N. Fitz Henry, store-keeper, and Mr. George D. O'Farrell, who was on the 2nd March, 1895, promoted to the position of lighthouse inspector. The workshops are under Mr. O. J. Samson, master carpenter, and Mr. G. Vézina, master shipsmith, and the gas works under Mr. G. Bélanger, engineer, with such assistance as required.

Mr. Gregory again bears testimony to the willingness and courtesy with which his staff have individually and unitedly aided him to carry out his orders.

The steamers at the disposal of the agency have been the SS. "Druid," which supplied the lights on the first trip to the Strait of Belle Isle, and was employed during the remainder of the season in buoy and lighthouse maintenance in the river St. Lawrence; and the "La Canadienne," which supplied the lights in the Gulf of St. Lawrence, and made a fall trip to Belle Isle. The service between Quebec and Montreal was by passenger boats and hired tugs or by rail.

The inspection of the light stations was made by Mr. Geo. O'Farrell, the newly appointed inspector of lights.

There are in this division 154 lights and 117 stations; 8 lightships, 3 of which are supplied with powerful steam fog-whistles; 9 explosive bomb signal stations in connection with lights; 2 steam fog-whistles, and 9 steam fog-horns; 10 gas buoys, 4 of which are supplied with bells; 140 wooden buoys and 59 day beacons.

NEW LIGHT ESTABLISHED.

A new lighthouse was erected on Newport Point, on the Chaleurs Bay, coast of Gaspé, and put in operation for the first time on the 18th September, 1895.

The lighthouse is a square, wooden, pyramidal building, painted white, surmounted by a square wooden lantern, and is 27 feet in height, from its base to the vane on the lantern. It stands on the bare rock in the middle of an island off the extremity of the point.

The light is fixed white, elevated 36 feet above high water mark and should be visible 12 miles from all points of approach seaward. The illuminating apparatus consists of a single lamp, strengthened by a pressed glass lens.

Tenders had been called for the erection of this lighthouse, but the lowest received amounted to \$825.00; the department considering this price altogether too high, had the tower erected by days' labour, the work being put in charge of Mr. Chisholm, a carpenter from Nova Scotia agency previously employed in similar work, who had the structure built at a cost of \$294.57.

IMPROVEMENTS TO LIGHTS.

Greenly Island Station.

The steam fog-horn building at Greenly Island light station, in the Strait of Belle Isle, has been moved to a new site 900 feet S.E. by E. from its former position south of the lighthouse, and the building now stands at the southern extremity of Greenly Island as near the shore as the waves will permit. The signal is a blast of 10 seconds' duration, with intervals of 80 seconds between the blasts.

Thirty-nine large sized reflectors tarnished by age and otherwise injured were brought up to Quebec during the winter, repaired, re-silvered and returned to their respective stations.

The re-silvering was done by three different firms at same rate, viz., 2 cents per square inch—4 grains silver—the workmanship was equally good.

The total cost was \$355.16, or an average of about \$9 each. The reflectors are now equal to new, and the lights in consequence much improved, especially above Quebec.

PRINCIPAL REPAIRS AT EXISTING STATIONS.

The following is a statement of the more extensive repairs and improvements made at the several stations during the past year. In addition to those mentioned, ordinary repairs and replacing of supplies were made and painting done wherever required.

Amherst Island.—Extensive repairs are being carried out at this lighthouse. The estimates for labour having been considered too high, a foreman from Quebec was sent with another man to attend to the work. These repairs are not yet completed. The sum of \$284.18 has been spent for material to 30th June, 1895.

Anticosti, Heath Point.—Workmen were sent from Quebec on the supply trip to attend to urgent repairs reported necessary. Five thousand shingles required to complete the shingling of the barn and the Sailors' Home, and two thousand feet of lumber to make general repairs were provided at a cost of \$50.25.

Anticosti, South-west Point.—Repairs made to the old boat at this station and spars supplied, and the old buildings repaired at a total cost of \$351.90, by men sent from Quebec.

Anticosti, West Point.—Repairs made at this station during the last fiscal year amount to \$226.17. The water pipes at this station, although inclosed in a wooden box laid in a deep trench, again froze last winter and are reported by the keeper as a complete failure owing to frost.

The flag staff and signal house have been removed at a cost of \$20, the removal of the building being necessary owing to the encroachment of the sea. The breakwater is also undergoing considerable repairs by men sent from Quebec. In addition to the repairs being made, the breakwater is also to be lengthened 100 feet.

Belle Isle.—This station was provided with a large iron tank at a cost of \$40. The wharf was completely carried away on the 20th November last, and two men and material were sent from Quebec to repair it and make necessary repairs to buildings. On the 30th June, 1895, \$99.45 had been spent for lumber. The landing will be made stronger by filling with stone, plenty being near at hand.

Biquette.—A boat 18 feet long was supplied this station, at a cost of \$30, and an alarm clock also provided. A change in the revolving gear was made in November last by renewing the hoisting apparatus, and the keeper has reported it in good working order. The necessary material for the work was sent from store at Quebec.

Bird Rocks.—A powerful telescope has been supplied the light-keeper, at a cost of \$16. The sum of \$53.20 has been spent for lumber for different repairs at this station.

Cape Bauld.—The construction of a boat-house having been authorized, the cost not to exceed \$75, the frame was fitted up in Quebec last winter. The sum of \$140.78 has been spent at this station on repairs, shingles, lumber, &c.

Cape Charles.—A new lantern was erected this spring, and repairs also made to mast. This was performed by men sent from Quebec, at a cost of \$60.21.

Cape Despair.—A storehouse and barn required at this station have been built, at a cost of \$296.50, by Mr. Philip Vibert, a joiner of that locality. The sum of \$51 was also spent in repairing kitchen and painting.

Cape Gaspé.—The jib on roof of gun-shed for firing fog signals having been blown down on the 5th October, 1894, a new one was at once put up. The total sum of \$84.58 was spent on lumber and repairs.

Cape Norman.—The Holmes horn has been overhauled and fitted up for use at this station as a spare horn in case of emergency, and repairs have also been made to the boiler, at a total cost of \$166.83.

Cape Ray.—A coal shed for this station was built in Quebec and sent by supply steamer at a cost of \$221.72.

Cape Rosier.—A well was dug at a cost of \$200, and a pump fitted which can deliver 10 gallons per minute. A telescope, an alarm clock and thermometer have also been supplied this station. Repairs to the buildings have been made at a total cost of \$155.41. A new fence was also put up, at a cost of \$20.

Cape Salmon.—Placing this new station in an efficient condition has caused an unusual outlay. A large well was dug in the rocks to collect surface water for the steam fog-horn. A new boat was provided, a road made to the highway, and cut down and cleared surrounding wood, bringing the expenditure to \$780.68.

Champlain.—A larger building was erected for the pole light of the Back Range provided with the necessary hoisting apparatus. The cost of this improvement was \$65.06.

Crane Island.—The lighthouse at this station had to be levelled up on its foundations, and six rooms in the dwelling repaired. The work was performed by men sent from Quebec, at a cost of \$260.00.

Eboulements.—An inclosed lantern was erected by the keeper, Mr. Mag. Tremblay, on the freight shed, at a cost of \$50.00, to replace the pole lantern previously used. A further sum of \$19.50 was spent for ventilators, glass, illuminating apparatus, etc.

Egg Island.—This station was supplied with a suitable telescope—the one on hand not being worth repairs.

Isle à la Bauge.—The pier which was badly damaged by ice, was repaired at a total cost of \$201.65. The "Druid" is also to take down 20 toise of rip rap stone to protect the pier against further damage during the winter, at a cost of \$124.00.

Isle Ste. Thérèse.—The low range was painted. Repairs to the tower and pier have been completed for the sum of \$112.90, including material, wages, board and passage of workmen to and from Isle Ste. Thérèse, the work having been performed by men sent from Quebec.

Kamouraska.—The slip at this station having been considerably injured by the ice last winter, a contract was entered into with Mr. Onésime Bélanger, of Kamouraska, for the repairs required, for the sum of \$100.00, this being the lowest tender received. The chimney was also repaired at a cost of \$25.52.

Lark Islet.—A No. 2½ Blake pump for the fog signal was purchased from Messrs. Robert Buchanan & Co., of Montreal, for \$114.66. Lumber was sent down from Quebec for repairs, at a cost of \$22.25.

Lower Traverse Lightship.—Extensive repairs were done to the boiler and engine of this lightship this spring, at a total cost of \$592.04.

Macquereau Point.—The signal mast at this station was blown down on the 11th October, 1894, and was put up again at once. Double windows have been provided at this station; new flooring has been laid, and the foundation cemented, and the middle room of building repaired, the cost in all amounting to \$74.50.

Matane.—Four panes of glass were ordered from Messrs. A. Ramsay & Son of Montreal at a cost of \$12. The fence around the lighthouse was also renewed at a cost of \$32.

Montée du Lac.—The two range lights at this station have been repaired, at a total expenditure of \$451.31.

Percé.—A new set of lamps with mammoth flat wicks and large reflectors have been fitted in the agency's workshop at Quebec and have been put in the place of the inferior lamps used here previously.

The Pillars.—A new dwelling has been built at this station at a cost of \$975. The work has been satisfactorily done by Mr. Trudel, the contractor. The work required at the breakwater for protecting the boat harbour was performed at a cost of \$125. A new boat for this station has been built at a cost of \$88. The illuminating apparatus was readjusted by Mr. Noble, foreman of works, and it is now working satisfactorily.

Plateau Rock.—The work of painting, cementing and clearing the cistern was done by the keeper with local assistance. The foundations of the buildings were also repaired, and material for the work sent from Quebec—the amount of these repairs being \$55.

Port St. Francis.—The back range having been destroyed by fire on the 18th August, 1894, a new tower was built at Quebec, and taken to the station, where it was put up on the pier, which was also repaired, the total cost of the work amounting to \$294.25.

Red Island Lighthouse.—Repairs were made to the dwelling and the pointing of the stone work was also carried out. The total cost of the work was \$203.28.

Red Island Lightship.—Extensive repairs were made to this lightship last winter, while on the patent slip. The engines were also repaired and everything put in good order. The total expenditure incurred in repairs was \$1,040.79. The vessel was also supplied with a suitable boat, at a cost of \$88; as also an anchor and chain, the cost of which was \$154.85.

Upper Traverse Lightship.—The decks were caulked last spring, and new water closets and scuppers were supplied; the total cost of the work amounting to \$268.46.

White Island Reef Lightship.—Extensive repairs were made to the engine and boiler during the winter, which were put in first class order at a total cost of \$786.20.

The following are the principal minor expenditures made in connection with maintenance of lights in this district:

Station.	Description of Work.	Cost.
		\$ cts.
Algernon Rock.....	Replazing lantern.....	15 00
Anticosti, South Point ..	Painting and repairs.....	115 12
Batican.....	Trees obstructing light cut	10 00
Bay St. Paul.....	Assistance in painting.....	13 60
Bellechasse.....	Materials for repairs to oil shed.....	13 10
Brandy Pots.....	Small boat repaired.....	8 84
Cape Magdalen (en haut)...	Repairs to window.....	2 00
do (en bas).....	Lumber for repairs.....	25 72
Contrecoeur back.....	Painting and repairs to platform.....	10 00
Étang du Nord.....	Shingles for re-roofing buildings.....	19 50
Fame Point.....	Boards for repairs.....	28 56
Father Point.....	Repairs to lighthouse.....	21 28
do.....	Re-pairs to coal shed.....	15 00
Green Island.....	Boat.....	25 00
Greenly Island.....	Boat supplied.....	
Lacolle.....	Repairs to roof of lantern.....	14 75
do.....	Pier deck renewed and painting.....	15 00
Lavaltrie.....	Piers refilled and ballasted.....	50 00
Lake St. Peter, Lightship No. 3.....	New boat.....	45 00
Lotbinière front.....	Roof repaired and painting.....	30 00
Platon.....	General repairs.....	13 50
Pointe du Lac.....	Ventilator renewed.....	11 50
Pointe St. Jean.....	Base of tower renewed.....	83 17
Point Rich.....	Lumber for repairs.....	25 00
Portneuf (en bas).....	Assistance, painting.....	15 00
St. Pierre les Becquets.....	Repairs to roof of lantern.....	17 00
St. Pierre d'Orléans.....	Boat.....	22 50

FOG-ALARMS, STEAM WHISTLES, COMPRESSED AIR HORNS, AND GUN COTTON, EXPLOSIVE BOMBS AND CARTRIDGES.

Canadian manufactured gun cotton, bombs and cartridges were sent to Quebec last fall by Mr. Hand, of Hamilton, Ontario, and were stored in the magazine with a quantity of imported ones. In the spring, a test of both was made at Quebec and at stations in the Gulf, which resulted in establishing the fact that the Canadian manufactured explosives stand the climate and are as effective in report as those imported. They can be more conveniently obtained, and cost no more than the imported ones.

Inquiry into complaints of fog-alarms not being properly attended to, have thus far resulted in establishing that there had been neither neglect nor incompetency on the part of the operators, but the defect was owing to the sound not being distinguished on account of atmospheric influences, even when vessels were but a comparatively short distance away.

BUOY SERVICE.

The buoys in the ship channel, between Quebec and Montreal, are maintained under a contract with the Sincennes-McNaughton Line.

The total cost of the buoy service in the Quebec district including contracts, for the wintering, repairing, replacing, taking up and renewing buoys and beacons, for the last fiscal year was \$3,495.18.

The buoys in the Dominion of Canada, as a rule, are maintained in position during the season of navigation. In districts where the lights are maintained in operation throughout the year, the buoys are kept in position all the year round; in districts where navigation is closed in winter, buoys are kept out in the autumn until the last vessels are cleared, or as late as the ice will allow, with due regard to their safety; and replaced in spring as soon as the state of the ice will admit of their being placed in position.

All the can buoys in the River St. Lawrence below Quebec, are removed after the 14th November; all the gas buoys in the same river are set out as soon as possible after the 11th May each spring, and taken up as soon as convenient after the 10th November each autumn.

The following buoys in the River St. Lawrence, when removed for winter, are replaced by large wooden spar buoys, each topped by an evergreen bush to make it more conspicuous:—

Barrett Ledge, gas buoy; Pilgrim's Shoal, gas buoy; St. Roch, wooden can buoy; Middle Ground, gas buoy; Channel Patch, gas buoy; Crane Island Patch, wooden can buoy; Crane Island Flats, gas buoy; Beaujeu Bank West End, gas buoy.

The gas buoys on Trembles Shoal, and off Ste. Croix, in the River St. Lawrence, Quebec, will also be replaced by spar buoys, if the last heavy draught vessel has not passed these points before it is necessary to remove them.

These spar buoys are intended for the use of belated vessels to pass outwards and inwards the eight principal points below Quebec, and have now become a necessity, and are much appreciated by navigators, as they are placed in position after all other buoys are taken away for the winter.

The White Island lightship now maintained off the north-west extremity of White Island Reef leaves her station each year for winter quarters in Quebec, on the 15th November, the same day as the other lightships below Quebec, and she returns to her station in the spring as early as ice will permit.

Barrett Ledge Gas Buoy.

On the opening of navigation, the spherical gas buoy on Barrett Ledge, in the River St. Lawrence below Quebec, was replaced by an iron buoy cylindrical in plan, with a domed top, surmounted by a wooden slat work, shaped like a can buoy, above which the little red lantern from which the gas light is shown, stands. The focal plane is 9 feet above water.

Middle Ground Gas Buoy.

The spherical gas buoy on the Middle Ground near the east end of South Traverse in the River St. Lawrence has been replaced by a buoy similar to the new Barrett Ledge buoy, surmounted by a conical slat work. The focal plane is about 10 feet above water.

These two new buoys were brought from England by the SS. "Aberdeen" and landed at Pictou, N.S., and brought over to Quebec by the "La Canadienne."

They are solidly built and stand more upright in currents, and consequently show better light than the old pattern spherical buoy. They are also less liable to serious injury to the lanterns from collisions. The body of the buoy being welded seamless, no gas can escape from starting of seams.

In the event of either of these buoys, or any of the large gas and bell buoys in the River St. Lawrence being lost, their places may be temporarily taken by spherical buoys.

Beaujeu Bank Gas Buoy.

Owing to representations made by the Quebec corporation of pilots and others, the gas buoy moored on the west end of Beaujeu Bank has been moved to a point about 35 feet south from the point where it formerly stood.

The cost of the gas buoy service for the past year was as follows:—

Two new buoys.....	\$ 2,216.07
Repairs and fitting, scraping, painting, wages of engineer and assistant.....	1,621.16
Total.....	\$ 3,837.23

The red can buoy on the reef west of Red Islet, in the River St. Lawrence below Quebec, was discontinued on the opening of navigation this year.

Removal of Murray Bay Buoy.

The red wooden can buoy moored on the outer end of the shoal extending east of the Government pier at Pointe au Pic, Murray Bay, on the north shore of the River St. Lawrence has been moored one-third cable south-east, as shoal water was found outside of its former position, and the buoy is now moored in $2\frac{1}{2}$ fathoms water.

NOVA SCOTIA LIGHTHOUSE DIVISION.

This division, in charge of Mr. J. Parsons, agent of the department for the province, includes the charge of 180 light stations, exhibiting 192 lights, 1 light vessel, 16 steam fog-alarms, 1 signal bomb station, 18 hand fog-alarms, 2 fog bells, 17 automatic whistling buoys, 13 automatic bell buoys, 98 iron can buoys, about 700 spar and other small buoys, 8 stationary beacons, 16 life saving stations, 3 humane establishments and 4 signal stations. The steamers "Newfield" and "Aberdeen" are also under the control of this agency.

The lighthouses and fog-alarms throughout this division have been inspected by Mr. C. A. Hutchins, superintendent of lights, and the boilers and machinery were examined by Mr. Stewart, chief engineer of the "Newfield."

NEW LIGHTS ESTABLISHED.

Gillis Point.

The new lighthouse at Gillis Point, Bras d'Or Lake, to which reference was made in last year's report, was duly completed and put in operation on the 1st of

January this year. The light is fixed white, elevated 74 feet above high water mark, and should be visible 14 miles from all points of approach by water. The illuminating apparatus is dioptric of the seventh order.

The light building, which is of wood, stands about 300 feet westerly from the extremity of the point, and consists of a square pyramidal tower, with a small dwelling for the keeper attached. It is painted white and the tower is surmounted by an iron lantern painted red. The height of the tower from its base to the vane on the lantern is 38 feet.

The total expenditure in connection with construction of this light has been \$1,714.24.

Wolf Point.

A lighthouse has been erected on Wolf Point, on the western side of the entrance to Ship Harbour.

The light is a fixed light, elevated 87 feet above high water mark, and visible 15 miles from all points of approach by water. The illuminating apparatus is dioptric of the seventh order.

The lighthouse is of wood, and consists of a square pyramidal tower with dwelling attached, the whole painted white, and surmounted by an iron lantern painted red. The height of the tower from the base to the vane on the lantern is 35 feet.

The light is intended principally to guide vessels into and out of Ship Harbour, or to a safe anchorage inside the islands.

The work of erection was done by Mr. John Chisholm, by day's work, local labour being employed, the materials having been procured in Halifax and sent to the station by the "Newfield." The cost of the work amounted to \$1,557.45. This course was pursued in consequence of the lowest tender received, \$2,290, being higher than the estimate of the chief engineer of the department.

LIGHTS DISCONTINUED.

Uniacke Point.—As indicated in last year's report, the light on Uniacke Point, at the north end of the Grand Narrows Bridge, was permanently discontinued on the 1st January last, when the light at Gillis Point was put in operation, the keeper being transferred from the one station to the other.

Cow Bay.—In February last, a gale carried away the outer end of the pier at Cow Bay, Atlantic Coast of Cape Breton, with the lantern and framework from which the light was shown. Since then no light has been maintained at that place, nor will it be re-established at present.

Red Islands.

A lighthouse has also been erected on the west side of Campbell's Cove, Red Island Settlement, on the southern shore of the Great Bras d'Or Lake.

The building is a square tower, painted white, surmounted by an iron lantern painted red, and placed 50 feet back from the extremity of the point, and is 37 feet high from base to vane on lantern.

The illuminating apparatus is a dioptric of the seventh order, and the light, which is fixed red, is 47 feet above high water mark, and visible at a distance of eight miles from all points of approach.

The light is principally intended for the guidance of vessels navigating the Great Bras d'Or Lake, between East Bay and St. Peter's Inlet, and to lead clear of the shoals extending southerly from the Red Islands. The light will be put in operation in November, 1895.

The work of erection of the lighthouse was done by Mr. Johnstone, of Red Island Settlement, whose contract price was \$885.00.

REPAIRS AND IMPROVEMENTS.

The following repairs and improvements in addition to ordinary and small repairs and painting, have been made at various stations, viz.:

EAST OF HALIFAX.

Meagher's Beach.

The ventilator on lantern was repaired. The second easterly groin was rebuilt from the second lower course, and the planking in the face of the breakwater was renewed and strengthened.

Jeddore.

New spouts were fitted under the eaves of the barn and dwelling, and new conductors were laid to the tank in the cellar.

Egg Island.

A new shaft was fitted to the revolving clock.

Pope's Harbour.

The roof of the porch was re-boarded and shingled, and a new sill fitted under the porch. The lighthouse and buildings were painted. A new pane of glass was fitted in the lantern.

Sheet Rock.

The north roof of the dwelling and the roofs of the boat-house and shed were re-shingled. The underpinning of boat-house was renewed, as also the platform in front of the lighthouse. The water-conductors, from the roof to tank, were also renewed. Five broken panes of glass in lantern were replaced with rubber strips. One sill under kitchen was renewed; battens were stripped off walls and replaced shingles. One frame and two batten doors were fitted to dwelling. The oil store moved back to a better foundation.

Beaver Island.

New spouts were fitted.

Beaver Harbour.

A new lantern was supplied.

Liscomb.

Six new lamps were supplied. Renewed three sills of tower, two sills of dwelling, and part of one corner post. The clapboards were stripped off the walls of the tower and dwelling, and shingling was substituted. Fitted two new window frames, one sash, two door frames and doors to cellar. A new platform, railing and steps placed at front entrance. Sheathed the walls of hall with pine.

Wedge Island.

The roofs of the dwelling-house and oil store were re-shingled. The buildings were painted. The carpenter work was done by Mr. MacLellan, with local help.

Isaac's Harbour.

A new boat slip and capstan were built at landing.

Three Top Island.

The roof of the kitchen was raised on the inside end to give more pitch, and it was re-shingled, the work being done by Mr. MacLellan.

Canso Harbour.

The wooden lantern was repaired and the buildings painted. The work was done by Mr. MacLellan.

Eddy Point.

The new lighthouse was put in operation, as anticipated, on the 1st January of this year.

Jerseyman Island.

A wooden rail was placed around the lantern and the deck renewed. Three new reflectors were also supplied.

Petit de Grat.

A new landing slip in course of construction and the sills of the lantern are to be renewed.

Cape La Ronde.

The kitchen chimney was taken down and rebuilt from the roof. New clamps for blind rollers were furnished.

Guyon Island.

A new brass hinge was fitted to the lantern door, and two new reflectors supplied.

Louisbourg.

The foundation wall was pointed and the plaster in two rooms repaired. Ten new lamp fountains were supplied.

Scattarie.

A new boat was supplied. A new entrance porch was placed to dwelling and a storm door fitted to kitchen. New steps were placed to entrance door of lighthouse and the foundation walls were pointed with cement.

Gillis Point.

A new boat was supplied. A drain opened up and relaid with more slope.

Cape George.

The buildings were painted. The lantern deck was stripped, the decayed wood renewed, the deck recovered with canvas and a new hand-rail fitted around deck.

Ingonish Harbour.

The oil stove was entirely destroyed by the sea during a heavy gale in February last, and the lower floor in tower was slightly forced up and the shingles stripped from the base of tower. The damage to the tower is being repaired. A new boat was supplied, the old one having also been destroyed in the storm.

Cape North.

The road leading from the landing to the station was repaired.

Merigomish.

The plaster in bed room was repaired, and the drain opened up and renewed. A small storm porch was built at entrance to dwelling.

Amet Island.

The kitchen floor was recovered and the chimney rebuilt from roof. The boat slip was repaired.

New falls and blocks were furnished the capstan at the boat landing.

WEST OF HALIFAX.

Sambro.

Two sills, five joists, two doors and one frame renewed and both ends of oil store shingled. New joist, a floor and steps in cellar were fitted. The sills and five joists, floor and three windows and frames were renewed in dwelling. The base and corner boards were stripped off and the shingles removed. About 25 yards of plaster were repaired.

Argyle.

Six new lamp fountains were supplied.

Gull Rock.

Twelve new panes of glass were put in lantern with rubber strips. The canvas on the deck was repaired.

Cape Fourchu.

A new boat was supplied.

Port George.

A new copper ventilator was fitted in the lantern.

Margaretsville.

A new copper ventilator was fitted in the lantern. The copper covering in lantern deck was removed and canvas substituted.

Black Rock.

The floor and sills of porch were renewed. The door on west side of porch was boarded and shingled. The porch door was repaired and three new thresholds fitted. The light room was re-plastered and the flat roof repaired. The work was done by Mr. MacLellan.

Port Williams.

Two new panes of glass were fitted in the lantern and all the other panes were re-glazed. The floor of lower lantern was covered with galvanized iron. A new sill was fitted under the front of building and a new threshold made. A new platform was also placed in front of entrance. Work done by Mr. MacLellan.

BUOY SERVICE.

ADDITIONAL BUOYS.

Lighthouse Bank Can Buoy.

A 5-foot iron can buoy was, on the 2nd of May, 1895, placed to mark the shoal known as Lighthouse Bank, about four cables to the southward of Meagher's Beach Light, in Halifax Harbour.

The buoy is moored in 6 fathoms of water, S.W. from the $2\frac{3}{4}$ fathoms line in the middle of the shoal.

Spry Bay Bell Buoy.

A bell buoy was moored off the entrance to Spry Bay, on the southern coast of Nova Scotia, as a fairway buoy for the benefit of fishermen and others entering the bay. The buoy is painted red, with "Spry Bay" in white letters on the deck, and moored in about 15 fathoms of water.

North East Shoal Whistling Buoy.

An automatic whistling buoy was moored $1\frac{3}{4}$ miles N. by E. from the middle of North East Shoal, off Green Island, between St. Margaret's Bay and Mahone Bay, as a fairway buoy to indicate the position of the shoal, from which vessels may take a departure for Mahone Bay, St. Margaret's Bay, &c.

The buoy is painted black with N.E., Shoal in white letters and moored in 21 fathoms of water.

Louisbourg Bell Buoy.

A bell buoy of Trinity House pattern was placed in 13 fathoms of water $1\frac{1}{2}$ cables E. from the centre of Harbour Shoal, near the entrance to Louisbourg Harbour, to serve as a fairway buoy to vessels entering the harbour during thick or foggy weather.

Old Woman Ledge.

The red spar buoy marking Old Woman, off Frenchman Point, on the coast of Yarmouth, was replaced by a red can buoy, to be permanently maintained at this station.

The buoy is moored in $3\frac{1}{2}$ fathoms, 400 yards south of the ledge.

ADDITIONAL BUOYS IN GREAT BRAS D'OR.

Two additional spar buoys have been placed at the eastern entrance to Great Bras d'Or, Cape Breton Island, as follows:—

Blackrock Shoal.

A wooden spar buoy painted black, moored in $3\frac{1}{2}$ fathoms of water, on the edge of the shoal running north from Blackrock Point.

Campbell's Point.

A wooden spar buoy painted black, moored in $3\frac{1}{2}$ fathoms of water on the northern extremity of the shoal off Campbell's Point.

The following additional buoys are to be placed at Carey's Shoal, Great Bras d'Or, a No. 2 iron can buoy, at Point Aconi, a No. 1 iron can buoy off the extremity of the shoal.

CASUALTIES AND REPAIRS.

The following is a list of casualties, additions, &c.

Isaac's Harbour Automatic.

This buoy was reported by the Dominion Government steamer "Acadia" last November, adrift about six miles off Indian Harbour, and has not since been recovered.

Brig Rock, No. 1 Can Buoy, 5 feet diameter.

The "Newfield" found the buoy had disappeared on April 2nd, 1895. Not since recovered.

Trinidad Rock No. 2 Iron Can Buoy, 4 feet diameter.

The "Newfield" found the buoy had disappeared on April 13th, 1895. Not since recovered.

Bell Rock 60 feet spar buoy.

The buoy disappeared April 19th, 1895. Not since recovered.

Portuguese No. 1 Iron Can Buoy, 5 feet diameter.

Went adrift April 19th, 1895, and was destroyed on the rocks.

Rock Head.

No. 1 iron cage buoy went adrift on April 19th, 1895, and was hauled ashore by fishermen at Bear Cove, with loss of cage and moorings, and the buoy was badly damaged on rocks.

Lunenburg—Automatic.

December 8th, 1895.—This buoy was found damaged in bilge, from collision.

Sisters—Bell Buoy.

This buoy was reported adrift on February 13th, 1895. It was picked up by tug off Mars Head, with loss of 33 fathoms of chain and mooring stone.

Blonde Rock Automatic Buoy.

This buoy broke from its moorings on the 19th of April, 1895, and was picked up by Captain Ansel Snow and taken into Yarmouth. Captain Snow made a salvage claim of \$450. After consideration of the claim, the department offered the captain and the crew of the "Norwood" the sum of \$250 in settlement of the claim, and Mr. Pelton, Captain Snow's solicitor, was advised of the decision of the department, and the offer made has been accepted by the salvors.

On the 24th April, 1895, the steamer "Lansdowne" placed this buoy in true position, moored with seven fathoms of new wire and thirty-eight fathoms of new chain $1\frac{1}{4}$ inch and a granite stone weighing 5,000 lbs.

John's Ledge Bell Buoy.

The buoy was removed by the steamer "Lansdowne" on the 13th December last and replaced by another buoy, which was taken from Yarmouth Fairway, the said buoy having been scraped, painted and lettered, moorings thoroughly overhauled and found to be in good condition. The buoy was moored in 22 fathoms of water $1\frac{1}{4}$ miles S.W. Length of chain 45 fathoms, and stone weighing 4,000 lbs.

On May 17th, 1895, the steamer "Lansdowne" placed a new buoy on the Ledge, in true position, moored with 45 fathoms $1\frac{1}{4}$ inch chain and a granite anchor of 4,000 lbs. The old buoy and moorings were taken on deck and landed at St. John.

Lurcher Automatic Buoy.

This buoy was removed by the steamer "Lansdowne" on the 13th December, and replaced by another taken from St. John, and moored in 13 fathoms of water, with 45 fathoms of new $1\frac{1}{4}$ inch chain and a granite stone weighing 5,000 lbs., in the following position: $\frac{1}{4}$ of a mile west of the shoal. On the 14th May, 1895, the steamer "Lansdowne" replaced the Lurcher Automatic Buoy in true position, moored with 45 fathoms of $1\frac{1}{4}$ inch chain and 7 fathoms of wire. The old buoy with its moorings was taken on deck, and it was scraped and painted for the S. W. Yarmouth Fairway Automatic Buoy.

North-west Ledge Bell Buoy.

The buoy was removed by the steamer "Lansdowne" on the 7th December last, and replaced by another buoy taken from St. John and moored in 15 fathoms water, 400 yards N. N. W. $\frac{1}{2}$ W. from the N. W. rock, with a new chain 45 fathoms in length and a granite stone weighing 5,000 lbs.

The buoy taken up was scraped, painted and lettered for the Trinity Shoal.

The North-west Ledge buoy was again removed by the "Lansdowne" on the 10th May, 1895, and was replaced by another buoy taken from St. John, and moored in 15 fathoms of water, with 45 fathoms of chain $1\frac{1}{4}$ inch, and a stone of 4,000 lbs., in the following position: 400 yards N. N. W. $\frac{1}{2}$ W. from the N. W. rock. The old buoy was scraped and painted, to be placed on John's Ledge.

Old Man Can Buoy.

This buoy was taken up by the "Lansdowne" and was scraped, painted and lettered and had its moorings overhauled. It was found to be in good condition, and was placed in true position on the 13th December last.

On the 26th April, 1895, the "Lansdowne" placed a new can buoy in true position, moored with the old chain, which was found to be in very good condition, 15 fathoms long and 1 inch diameter, and a granite stone weighing 2,000 lbs.

Pease Ledge Can Buoy.

On the 12th and 13th December last the steamer "Lansdowne" proceeded to the Pease Ledge Can Buoy to have it examined, but on each occasion owing to a heavy sea and the increasing wind the buoy could not be handled, but it was in true position and apparently in good condition. On the 26th of April last, a new iron can buoy was placed off the ledge, moored with 15 fathoms of new chain and a stone weighing 2,000 lbs.

Roaring Bull Can Buoy.

This buoy was taken up by the steamer "Lansdowne." It was scraped, painted and lettered, and its moorings were thoroughly overhauled, and the stone breaking from the chain when being taken out of the mud, was replaced by another, and the buoy moored in true position with 35 fathoms of chain and a granite stone of 1,800 lbs., on the 13th December last.

On the 24th April, 1895, the "Lansdowne" placed a new can buoy in true position and took the old buoy and its moorings on board. The new buoy was moored with 20 fathoms of new three-quarter inch chain and a granite stone of 2,000 lbs.

Trinity Shoal Bell Buoy.

This buoy was removed by the "Lansdowne" on the 13th December, and replaced by another buoy taken from the N. W. ledge, and moored in 8 fathoms with 45 fathoms of $1\frac{1}{4}$ inch chain, and a granite stone weighing 4,000 lbs., in the following position:—W. by N $\frac{1}{2}$ N. 600 feet from the ledge or shoal. The old buoy was put in good condition for the Yarmouth Fairway Bell Buoy.

On the 19th April, the "Lansdowne" proceeded to Trinity Ledge, and placed a bell buoy, taken from St. John in true position. The old buoy with its moorings was taken on board and brought back to St. John.

Yarmouth S. W. Automatic Buoy.

This buoy having broken adrift, was replaced on the 30th October last by the "Lansdowne," by another buoy taken from St. John and moored in 34 fathoms of water, with 45 fathoms of $1\frac{1}{4}$ inch chain, and a granite stone weighing 4,000 lbs. in the following position:—10 miles S. W. by W $\frac{1}{2}$ W. from Cape Fourchu Light. On information obtained at Comeau's Cove, the original buoy was found at Meteghan and landed at Yarmouth.

Yarmouth Fairway Bell Buoy.

This buoy was removed by the steamer "Lansdowne" on the 13th of December last, and replaced by another buoy taken from Trinity shoal, and moored in 10 fathoms of water with 45 fathoms of chain $1\frac{1}{4}$ -inch, and a granite stone 4,000 lbs. in the following position :—From the Roaring Bull E. N. E. $1\frac{1}{2}$ miles, from Cape Fourchu N. E. by N. $3\frac{1}{2}$ miles. The old buoy was scraped, painted and lettered for John's Ledge.

The buoy was removed by the "Lansdowne" on the 11th May, 1895, and replaced by another taken from St. John, and placed in true position in 10 fathoms of water.

Yarmouth Automatic N. W. Buoy.

This buoy was removed by the steamer "Lansdowne" on the 13th December last, and replaced by another buoy taken from St. John, and moored in 22 fathoms of water, with 45 fathoms of chain $1\frac{1}{4}$ -inch, and a granite stone weighing 4,000 lbs., in the following position : N. W. by W. from Cape Fourchu Light, 5 miles distant.

This buoy was removed by the steamer "Lansdowne" on the 11th May, 1895, and replaced by another taken from St. John, and moored in true position in 22 fathoms of water, with 45 fathoms of $1\frac{1}{4}$ -inch chain and a granite anchor of 4,000 lbs.

SABLE ISLAND.

All the stations throughout the island were inspected by the Inspector of lights. The agent of the department also visited the island in March last and everything found satisfactory.

Five pony shelters erected during the fall and winter have proved a success. Ten tons of pressed hay had been sent to the island to be used in the worst weather of March and April, and we have the satisfying result of only four ponies having died during the winter.

A new set of rules was put in force for the patrolling of the island as follows :—

Rules for patrolling Sable Island.

1. In foggy or misty weather, the patrolling of Sable Island beaches and bars shall be performed twice each day, viz., early in the morning and late in the afternoon.

2. The patrolmen shall leave their stations for duty in the morning, not later than daylight—early dawn is preferable.

3. They shall begin their patrol work in the afternoon so late that they shall not reach their stations on returning until after nightfall.

4. Every patrolman shall note and report the hour of evening when he noticed the western and eastern lighthouses becoming illuminated ; and also at what hour each day these lights were extinguished in the morning.

5. The eastern and western patrolmen shall at each trip proceed out on the bars as far as said bars are dry.

6. Every patrolman shall without delay after his return to the station, report to the superintendent full particulars of his journey.

7. Every patrolman shall carry in a properly covered can strapped over his shoulder, a flat bottle of warm new milk for use of any shipwrecked persons who may be discovered on his tour.

WM. SMITH,

Deputy Minister of Marine and Fisheries.

During last winter and this summer no wrecks have occurred and no serious casualties nor striking incidents have happened.

Arrangements are completed for renewing the telephone line connecting all the out stations with the main station and with each other.

The repairs to the buildings of Nos. 1 and 3 stations were completed by carpenters aided by the staff on the island.

Wild Horses.—Fifty-one ponies were shipped off the island.

Cranberries.—Thirty-two barrels of cranberries were shipped off.

ST. PAUL'S ISLAND.

During a heavy gale last February, the sea carried away about 30 feet of the boat slip at the main station and also did some damage to the dwelling at the north-east light ; materials and workmen were landed by the "Newfield" to repair damages. All the buildings have been painted.

LIFE BOAT-STATIONS.

All the life boat stations throughout this division were inspected by Mr. Alfred Ogden, who reports directly to the department at Ottawa.

FOG ALARMS.

Cape Race.

One hundred and fifty boiler tubes were supplied.

Cranberry Head.

A pop safety valve was fitted to boiler, an additional link was added to trumpet to prevent rain water beating in.

Cross Island.

A new set of tubes and a pop safety valve were fitted to boiler. Seven holes in the shell of boiler were plugged. A new steam pipe was fitted to trumpet and the position of the blow off pipe was changed. The feed pipe from tank to injector was repaired. Three new reeds were furnished to trumpet.

The alarm now sounds single blasts of 20 seconds' duration in every 1½ minutes instead of 10 seconds as formerly.

Shelburne.

Took down and changed a portion of the main steam pipe from top of dome to side, and fitted a new pop safety valve to boiler. Fitted a new blow off pipe. Overhauled and re-ground cocks. Took off the old angle iron and put on new, changing position to 12 inches higher made new man hole joints. Cleaned out boiler.

Cape Sable

Lifted boiler and caulked the four corners and re-set seven studs in bottom. Made and fitted four new brackets in furnace. Bored out and refitted one rivet in leg of boiler. Renewed all joints and replaced boiler on legs.

Yarmouth.

Four pop safety valves were fitted to boilers. Sixty-eight feet of suction hose pipe and couplings were furnished. A chart book and recording gauge were furnished. One new tube was fitted and four joints in bottom caulked and the legs of right hand boiler cemented.

Cape d'Or.

A new boiler has been landed at this station and will be set up as soon as the foggy season is over.

Scattarie.

A new boiler sent by the "Newfield" will be placed in position as soon as the foggy season is over, and repairs to the building, including renewal of roofing, will be attended to at the same time.

NEW BRUNSWICK LIGHTHOUSE DIVISION.

This division comprises all the lighthouses and other aids to navigation within the boundaries of this province, both on the Bay of Fundy and on the Gulf of St. Lawrence side. The large buoys maintained by the Government on the Nova Scotia coast of the Bay of Fundy are also attended to by the steamer "Lansdowne" under the direction of the New Brunswick agent, but are otherwise under the control of the Nova Scotia agent.

During the past year Mr. J. H. Harding, who had been since October, 1871, agent of the department for the province of New Brunswick, was superannuated, and the division was then put in charge of Mr. F. J. Harding, who was chief clerk and accountant of the agency, and an inspector of lights, Mr. John Kelly, was also appointed.

There are in this agency 117 lighthouses and 12 fog-alarms, attended by 87 lighthouse keepers, 12 engineers and 10 assistants, making in all 109 employees in the agency.

NEW AIDS TO NAVIGATION AND IMPROVEMENTS IN EXISTING AIDS.

Gagetown Lighthouse.

A lighthouse was erected at the mouth of Gagetown Creek on the west side of the River St. John, and was put in operation on the opening of navigation in the spring.

The light is fixed white, elevated 53 feet above the ordinary level of the river. The lighthouse stands on a cribwork pier and is a square wooden pyramidal building painted white, surmounted by a square wooden lantern painted red. Its height from the deck of the pier to the vane on the lantern is 47 feet. The light is intended to guide vessels between Jersey and Musquash Island, and to show the turn in the river at Buzzas.

On the establishment of this light the light heretofore maintained at No Man's Friend or Buzzas was permanently discontinued, it being no longer required. The

old open frame structure being out of repair and requiring renewal, the opportunity was taken to improve the location of the light by the erection of the light at Gagetown, on the west shore, where it guides both up and down the river.

Oromocto Lighthouse.

The light mast at the head of the landing pier at Oromocto, on the River St. John, having become so rotten as to require renewal, advantage was taken of the occasion to remove the light to a site where it could be utilized both up and down the river, and at the same time to improve it by providing an inclosed tower instead of the unreliable lantern on a mast.

The new lighthouse stands on low land, on the shore of the river, 1,224 feet S. E. by E. $\frac{1}{4}$ E. of the site of the old light.

This light was put in operation on the 1st October, 1895, and is a fixed white light elevated 52 feet above the ordinary level of the river, and should be visible down the river to the bend at Middle Island, up stream towards the mouth of the River Oromocto and up River St. John towards Fredericton. The illuminating apparatus is dioptric of the seventh order.

The tower stands on a crib work pier. It is a square, wooden, pyramidal building, painted white, surmounted by a square wooden lantern, painted red. The height from the deck of the pier to the vane of the lantern is 47 feet.

Vessels bound up can steer for the light W. by S. $\frac{1}{2}$ S. as soon as they clear Middle Island shoal, and keep their course until past the the south end of the Oromocto Island; they then leave the light on the port hand, following the trend of Oromocto Island in mid-channel, until they bring Oromocto light astern and Wilmot Bluff Light a head when they steer N. W. $\frac{1}{4}$ N. for the latter light. Vessels bound down reverse these directions.

Shediac North Channel Range Lights.

Two range lights temporarily established on the beach at Pointe du Chêne, Shediac Bay, for the purpose of guiding vessels into Shediac harbour through the channel north and west of Zephyr and Medea rocks, were put in operation on the 29th August last, principally for the use of the Prince Edward Island steamers.

The mast on which the front range lantern is hoisted, stands on the northernmost part of Pointe du Chêne, 349 feet from the water's edge, and is 20 feet high, with a shed at its base painted white.

The light is a fixed red light elevated 32 feet above high water mark and should be visible seven miles in, and over a small arc on each side of the line of range. The light is shown from a tubular lantern with pressed glass lens.

The back mast stands 602 feet S. W. by S. from the front one and is 28 feet high, with a white shed at its base. The light is similar to the front one, is 38 feet above high water mark and should be visible seven miles.

To enter Shediac harbour by this channel vessels should steer for Cassio Point light until they bring these two red lights in one, bearing S. W. by S., and should keep them in one until they reach the alignment of Shediac Island Range Lights, when they haul up W. by N. $\frac{1}{4}$ N. As when entering by the South Channel they keep the Shediac Island Range Lights in one until the Pointe du Chêne railway wharf lights are brought into range.

Shediac Island Range Lights.

On the 1st October, 1895, the range lights on Shediac Island, Strait of Northumberland, were improved by substituting two inclosed towers for the two masts from which range lights were previously shown. One of these masts was a mere temporary structure, the old permanent mast with elevated platform having been destroyed by lightening in July, 1892.

The front range tower stands in the alignment of the masts 72 feet E. by S. $\frac{1}{8}$ S. from the position of the old back range mast, and is a square, pyramidal, wooden building, surmounted by a square wooden lantern, and is 37 feet high from its base to the vane on the lantern. The lantern and lantern base are painted red; the remainder of the tower is white.

The light is a fixed white catoptric light elevated 36 feet above high water and is visible 11 miles in and over a small arc on each side of the line of range. It will also show southwardly into the harbour.

The back tower stands near the inner shore of the island and is distant 619 feet W. by N. $\frac{1}{4}$ N. from the new front tower. It is in the alignment of the old lights. The building and light are similar to those above described for the front light, except that the tower is 47 feet high and the light 52 feet above high water mark and is visible 12 miles in the line of range.

REPAIRS TO EXISTING STATIONS.

St. John Beacon Light.

Twenty-seven new steps were made leading to the lights. Six posts found to be decayed were removed and replaced by new posts which have been properly fastened to the base and iron hand rail secured from top to bottom with clasps and bolts. The wooden railing on platform was repaired. New steps were put in from the lower post to within five feet of top. The repairs were made by the keeper with one assistant for 15 days.

Anderson's Hollow.

A gale on the 21st November, 1895, carried away the end of the pier, with the lighthouse upon it. Pending the re-building of the pier and tower a temporary pole light will be maintained.

Beaver Harbour Light.

The roof of the building adjoining the kitchen has been shingled and a new canvas put on the deck of the lantern. The kitchen and the apartments have been newly plastered at a cost of \$10. The lamps in the lantern repaired.

The boat slip washed away in the February storm was repaired.

Belle Isle Public Landing Range Lights.

The iron has been shifted from the old mast to the new lantern on mast at landing and securely placed.

Big Duck Island Fog-Alarm.

The boiler has been repaired and two sets of tubes put in, and a patch put on shell. The work was done by machinists sent for that purpose.

Bliss Island

The bridge between the lighthouse and dwelling was repaired. The floors of the dwelling were painted, as also the woodwork, and the rooms were painted and whitewashed. The boat was repaired and painted.

Bridge's Point.

This lighthouse on the River St. John has been removed a distance of 200 feet north from its former position to a site closer to the water's edge and closer to the point, where the light will be less obstructed by trees both up and down the river, as well as closer to the channel than in its old place.

The work was performed under contract by Mr. John Dow Brydges, at a cost of \$24.

Cape Jourimain Light.

Repairs were done under the supervision of Mr. Milton Walsh, foreman in the Prince Edward Island agency. The old sills of the tower were removed and replaced with new sills. The lower floor was taken up and replaced with new sleepers and new plank. The foundations were rebuilt, use being made of the stone in the old foundation. The support braces were taken down and iron anchor posts were attached to each of the octagonal posts of the tower and secured in the foundation, being firmly screwed down by nuts at their attachment to posts.

The walls of the lean-to or kitchen attached to the dwelling have been shingled and a well sunk in the kitchen.

The fence around the grounds has been repaired by placing twelve new stone posts, as also new boards and rails where found necessary, and a new gate was placed at the entrance of the grounds. A new door was also put in the dwelling.

A new fence six feet high has been erected around the garden.

Cape Spencer Light.

A new kitchen 21 x 16 feet has been built on to the east side of buildings, at a cost of \$72, of which \$40 was allowed by the department.

Carraquet Light.

A new boat has been supplied at a cost of \$24, as also a new door at a cost of \$3.

Dalhousie Light.

The stone foundation has been pointed with cement, as also the steps to tower, and a new floor laid in tower.

Fanjoy's Point Light.

A large amount of work was done by the keeper at this station in the way of cutting down trees and cleaning up the land in connection with the lighthouse.

Fort Jolly Point Light.

No repairs were made during the year. The derrick was repaired last year at a cost of \$7.

Gannet Rock Light.

In October, 1894, carpenter Ross and blacksmith Lewis erected a platform 12 x 14 at the south end of station, fastening the same to the rock by iron bolts and thereon erected a building 5 x 6 for the electric firing apparatus, which is now in good working order. Pilots and ship masters are loud in their praise of this new appliance.

Goose Lake Light.

Brush was placed where required around the fence in order to prevent the sand from blowing away.

Grand Manan Fog-Alarm.

The road from coal shute to shore has been repaired. New doors have been made for the coal house at the shore. The pipes were overhauled. New tubes have been placed in the boiler. The boilers, engine, smoke stack, and steam pipes have been painted. The outside walls and roof of whistle house have been painted and the inside of same whitewashed. The fence has been rebuilt and the coal shed whitewashed, including roof.

Green Head Light.

Part of the mast has been renewed. A new house has been built for the lantern and new steps placed. The rail leading to lantern has been repaired. The building has been painted and the lantern repaired. A survey of the site has been made as a preliminary to building an improved inclosed tower.

Grindstone Fog-Alarm and Light.

The boat has been painted. New pipes were laid to connect the tanks. A new anchor chain has been supplied. The floor of the engine house has been repaired. All the work was done by the keeper.

Letête Fog-Alarm.

During the year some fences have been built and the place generally improved. The coal shed floor has been substantially repaired with new sleepers and covering deals. The oil storeroom in connection with engine room has been sealed up with matched lumber and neatly painted, thus making a neat and convenient place to keep engine stores.

Machias Seal Island Light and Fog-Alarm.

New tubes were placed in boiler and patches put on same. The crown sheet was removed and patched, and necessary repairs were made to the machinery. Tubes have to be renewed here every four or five months on account of the action of the nature of the water used in the boiler. All the machinery has been repaired and is now in good order.

The barn has been shingled on the north side of the roof and the pipes and spouts repaired.

New brick piers were placed under the southern light and a new brick and stone pier underneath the lantern post in the centre of the northern light for some seven feet in height. Tramway also repaired.

Midjic Bluff Light.

The stone wall has been repaired and whitewashed, and the trees that obstructed the light have been cleared off.

Miscou Light and Alarm.

The clockwork of the revolving light has been repaired as also the building. The lantern was painted outside and inside as also the boiler and engine. All the work was done by the keeper and the station is in good order.

There is a telegraph station connected with this light as also a fog-alarm.

Middle Island Light.

This building has been completed. Fourteen dollars have been allowed for plastering the rooms.

Negro Town Point Light.

The foundation under the tower, being part of the breakwater, has been repaired by the Public Works Department, and all repairs to light have been done by the keeper.

Neguac.

The front range light on Neguac Wharf has been raised 10 feet and the light changed from white to red. The light is shown as before from a lantern hoisted on a mast at a height of 28 feet above high water mark, and the slatwork day beacon is painted white instead of red. A shed at the base of the mast is also painted white.

North Tracadie.

Repeated and serious changes in the shifting of the sand-bar outside the North Tracadie gully have given the department much trouble and have necessitated repeated changes in the arrangement of the range lights at the entrance.

In 1894 range lights were established on the north side of the gully. In May of this year the alignment of these lights was altered, and in September the whole system had to be again changed, the channel over the bar, which was marked by the range lights, on the north side, having filled up and a new and more direct channel having formed farther to the north. As this new channel now carries much better water and is much shorter than the old one, the buoys and lights have been re-arranged to lead through it, as follows :—

The range lights on the north side of the gully have been discontinued.

The front building of this range has been moved back to the south side of the gully and has been placed so as to form a range with the main light to lead through the channel over the bar. It now stands 109 feet S.E. by E. $\frac{1}{4}$ E. from the main

light in the tower. It is, as heretofore, fixed white, shown from a lantern hoisted on a pole 20 feet high, having a small shed at its base painted white. The light is elevated 24 feet above high water mark and should be visible 6 miles. The lantern is a tubular lantern with a pressed glass lens.

The red can buoy which formerly marked the outer end of the more southerly channel has been moved northwards to mark this new channel. It is now moored in five fathoms on the outer edge of the bar at the point where vessels should cross it and pick up the line of the range lights, and bears S.E. by E. from the main light. To mark the channel over the bar three red spar buoys have been placed at the turn on the north side of the channel, and a black spar buoy and a red can buoy on the south side. A red spar buoy is also moored on the east point of the Sand Bar inside the gully south-westwardly from the main light tower. The channel is between this buoy and the lighthouse.

Vessels entering the gully should bring the two lights in range and steer N.W. by W. $\frac{1}{2}$ W. until near the inner can buoy, then they should haul up north by west, round the south end of the beach, keeping close to it and leaving the light on the port hand, which will bring them inside the beach and out of danger.

The pier under the outer range light has been rebuilt.

On the 19th October, 1895, a spark from the steamer "Hampstead" set fire to Palmer's wharf on the River St. John. It was blowing a gale at the time, and the fire having gained considerable headway before it was noticed, the lighthouse was burned down, the keeper being only able to save the lantern, oil and oil tanks. The light was kept in operation until the close of navigation, by means of a tubular lantern on a pole.

The question of the best site for rebuilding the lighthouse is under consideration, as recommendations to remove it to the new government wharf and a petition asking that instead of leaving the lighthouse rebuilt at Palmer's Point, the new one should be erected at Van Wart's Point on the western shore of the river, have been received.

Partridge Island Fog-Alarm.

The station was painted and whitewashed from top to bottom, in the interior. The steam gauge has been removed from front of boiler and placed where it will not smoke up so much as formerly.

The brick floor was removed to permit repairs to copper blow off pipe. There have been ten days' work at this station, outside that performed by keeper.

Passamaquoddy Bay Light.

A new corner post has been added back of the stairway, in order to prevent the washing away of the steps by the seas and to strengthen same. Seven long cross-beams were placed under the house, and rail around platform, rebuilt partly with new material. Two new knees were placed for davits. The oil tanks and dwelling were painted; also the outside of the kitchen and railing.

The ceiling and dwelling and the block and trestle work have been whitewashed, and the inside of lantern has been painted.

A new floor has been laid in the kitchen, and both sides of kitchen shingled, and one end has sheathing paper under shingles. The platform has also been repaired.

The boats have been repaired and painted.

Pea Point Light.

A new lantern glass has been put in, the walls and woodwork of two rooms painted, and the ceilings of four rooms whitewashed. The stairs leading to the oil house have been repaired, as also the oil house. The oil tanks have been cleaned and painted. The outbuildings have all been whitewashed.

Point Lepreaux Fog-Alarm.

There were four new stays, $\frac{3}{4}$ iron, put on steam pipe and smoke stack. The boilers have been painted and all necessary repairs made to machinery. New tubes have also been put in the boilers and two leaky valves have been replaced by new ones.

A new canvas roof has been placed on flat roofed part on engine house and the roof repaired around steam pipes with shingles. There has also been a new collar placed around steam pipe.

The brick work inside engine house has been whitewashed to the height of six feet and the wall painted up to ceiling. The ceiling, which is of matched boards, has also been painted.

A new door was made for the coal shed. A new fence has been erected along the bank, at the dwelling house.

Point Lepreaux Light and Signal.

The derrick has been repaired and painted at a cost of \$4.

The boat has been repaired and painted. The repairs, including the hauling to and from workshop, amounted to \$13.

The barn has been shingled and repaired.

Portage Island Light.

This lighthouse has been repaired by Mr. Peter Drummond, who placed 7 new sills, 12 new posts, a new door frame and door and shingled the building, placing paper under the shingles and birch bark under the corner casing. A new platform was also built.

The foundation was relaid with new material, with the exception of one sill, which was found to be sound. This work was done by tender, at the sum of \$150. In addition to this, a charge was made for extras, and \$25 were allowed the contractor in full settlement of his claim.

A new platform was built around the dwelling, at a cost of \$90.

The dwelling house was also painted on three sides, as also the porch.

The lighthouse has also been painted, being given three coats where newly shingled.

The lantern was painted inside and outside, two plates removed and replaced. The painting of the dwelling, light tower and lantern was done by the keeper.

Preston Beach Light.

This front range light which was burned June 6th, 1894, has been repaired and painted. A new house has been erected and the floor laid, and a new railing has also been placed, at a cost of \$17.60. The lantern has been repaired at a cost of \$7.

Quaco Fog-Alarm.

A full set of tubes has been placed in the boiler. The boiler was raised and seven patches placed inside the furnace, the patches being secured with screw bolts. The boiler was then tested and found satisfactory. The old smoke stack was taken down and a new one erected, and new guys were also placed.

The brickwork under the boiler, has been relaid with new material. The smoke stack, brickwork, &c., have all been painted, as also the inside of dwelling house.

Railway Wharf and Moffat's Landing Light.

The building on the Railway Wharf is in good repair. The range light on Moffat's Wharf has been removed by Mr. Kilgour Shives, at a cost of some \$25, a distance of 229 feet, and has been securely fixed.

Richibucto South Beach.

Improvement was made in the alignment of the range of lights on the South Beach, at the entrance to Richibucto Harbour, by moving the back range light tower a distance of $112\frac{1}{2}$ feet southwardly from the former range light.

The two lights in range lead through the best water in the Albion channel, with a least depth of 9 feet on the bar.

The range light was built and completed by Mr. Allan Haynes, at a cost of about \$100.

Richibucto Head Light.

The building has been thoroughly cleaned, and the fence around the building repaired. A new gate has also been put up, and the ground has been harrowed and sown with grass seeds. All this work has been done by the keeper.

Sand Point.

A survey of the site of this river light has been made with a view to purchasing the land required for the erection of a new enclosed tower to replace the present open framed structure. Difficulty has been experienced in arranging for this land in consequence of the absence of the owner from the Dominion.

South Tracadie.

The front range light building at this station, was in September, 1895, moved 80 feet north-eastwardly, to suit a change in the channel over the bar which lies outside of South Tracadie Gully.

The front tower now stands 276 feet S. E. by S. $\frac{3}{4}$ S. from the back range light, and the two lights in one lead in from the strait N. W. by N. $\frac{3}{4}$ N. through the channel over the bar.

South-west Head Light.

Repairs were made to the barn and fence, as also the shed, and all were white-washed. A new chimney was built. New stays were placed to the southern flag staff, the old stays having parted in the gale of January 26th, 1895. The inside of the dwelling was repaired, as also the road leading to the lighthouse.

Swallow Tail Light.

The south side of the kitchen roof has been repaired. Some repairs were also made to the derrick platform, this being necessary owing to the damage sustained by the storm of the 8th of February.

Some rock that had started on to the tramway has been blasted. The inside of the dwelling house has been painted, and the windows in both lighthouse and dwelling have been reputtied and painted.

William's Landing Light.

The tower which was carried away by the spring freshet of 1894 has been rebuilt by Mr. James White, at a cost of some \$25, and is now in position.

BUOY SERVICE.

Zephyr Rock Buoy.

A new iron can buoy was shipped to Shediac, to be placed on the Zephyr Rock.

Cape Tormentine Buoys.

A nun buoy and a bell buoy were shipped to Cape Tormentine, and placed off the Cape by the steamer "Stanley."

Cape Jourimain Buoy.

The new buoy, painted red, with 15 fathoms of $\frac{3}{4}$ -in. chain and a fifteen hundred stone anchor, was placed on the end of the sand bar that runs out from Cape Jourimain Light, at $\frac{1}{4}$ mile N. E. of the cape, in latitude $46^{\circ} 69' 15''$ N., longitude $63^{\circ} 45' 15''$ W.

Tormentine Reef Buoy.

The bell buoy, with 20 fathoms of one-inch chain and a four thousand pound stone anchor, was placed off Tormentine Reef in latitude $46^{\circ} 6' 50''$ N., longitude $63^{\circ} 41' 45''$.

Automatic Buoy Whistles.

Six automatic buoy whistles were purchased from Messrs. T. McAvity & Sons, at a cost of \$219.

Black Point Automatic Buoy.

The Black Point buoy was removed by the steamer "Lansdowne" on the 31st of October last and replaced by another buoy, moored in $15\frac{1}{2}$ fathoms of water, with 15 fathoms of chain and a granite stone weighing 4,000 pounds, placed in true

position, bearing from Partridge Island N. $\frac{1}{2}$ W., distance of $3\frac{1}{2}$ miles; Mispick Point E. $\frac{7}{8}$ N., distance $1\frac{1}{2}$ miles; south-west end of Manawagonish Island N.W. by W. $3\frac{7}{8}$ miles. On the 29th April, 1895, the steamer "Lansdowne" replaced the Black Point automatic buoy in true position.

The old buoy and moorings were taken on board and landed on the government pier.

Partridge Island Bell Buoy.

The bell buoy was removed on the 15th November, and after the necessary repairs and painting had been made it was replaced in its proper position by the "Lansdowne" on the 4th December, 1894. It was again overhauled by the "Lansdowne" on the 7th June last.

Belle Isle Buoys.

A contract for the maintaining of four buoys in Belle Isle Bay was entered into on the 1st of May last for a period of three years, for \$45 per annum.

Buctouche Buoys.

Mr. Jacob Babineau entered into a contract with this department for maintenance of fifteen buoys in the Buctouche River, for the sum of \$42 per annum.

The contract expires on the 10th of May, 1896.

Beaver Harbour Buoys.

Mr. Philip Hutton's contract for maintaining nine buoys at this place was renewed for a further period of three years, at \$120 per annum, being the same amount as the last contract.

Baie Verte Buoys.

A new contract was entered into on the 13th of May last for a period of three years with Mr. Jared S. Silliker, for the maintenance of thirty buoys at this place, for the sum of \$19 per annum, being \$3 less than the previous contract.

Chebogue Ledge Can Buoy.

The buoy was taken on the deck of the steamer "Lansdowne," scraped and painted, moorings thoroughly examined and found to be in good order. The buoy was again placed in true position on the 13th of December last; and on the 15th May, 1895, the steamer "Lansdowne" placed a new can buoy in true position, moored with 20 fathoms of 1-inch chain, and a stone anchor of 1,800 pounds. The old buoy and moorings were landed at St. John, on the ballast wharf.

Dalhousie Buoys.

Mr. Robert McNeill has the contract for placing nine buoys in the Restigouche River, for \$144 per annum. His contract expires in May, 1896.

Dipper Harbour Buoys.

The department has entered into a contract with Mr. Robert Ellis, for the maintenance of three spar buoys at this place, for a period of three years, from the 29th of March, 1895, for \$15 per annum, being \$15 less than the previous contract with Mr. Belmore.

French Lake Buoys.

Mr. Abijah Coakley's contract was renewed for three years, for maintaining the buoys from Indian Head to mouth of Little River, for \$44 per annum. His contract expires 4th of April, 1898.

GRAND LAKE BUOYS.

Jemseg District.

A new contract was entered into on the 14th of May last with Mr. Joshua D. Colwell, for a period of three years, for the maintenance of thirteen spar buoys, one flag station, and the keeping in position of one hundred and fifty stakes in the dredge track, for the sum of \$29 per annum.

Little Shippegan Buoys.

Articles of agreement were entered into on the 5th of April last, with Charles Vibert, for the maintenance of eight buoys at this place for a period of three years, at \$59 per annum.

Musquash River Buoys.

A new contract for a period of three years was entered into with Robert Ellis, on the 29th of March last, for maintaining seven buoys at \$35 per annum, being \$35 less than the previous contract with Hugh Belmore.

Miramichi Buoys.

Two new iron can buoys for the river were sent to the harbour master at Chatham on the 7th of May last.

Point Lepreaux Automatic Buoy.

The buoy was removed by the steamer "Lansdowne" on the 24th of November last, and replaced by another taken from St. John, and moored in 23 fathoms of water, with a chain 45 fathoms in length and 1½ inch in size, and a granite stone weighing 4,000 lbs., in the following position: one mile S. S. W. from the light; and on the 3rd December last, the steamer "Lansdowne" proceeded to Point Lepreaux buoy, removed the whistle, which was out of order, and replaced it with another.

The buoy having being reported out of order on the 18th January last, the tug "Storm King" was despatched to the buoy, with G. W. J. Bissett, master of steamer "Lansdowne" on board. The whistle was found to be gone, and it was replaced by another taken from St. John.

On the 7th May, 1895, the steamer "Lansdowne" replaced the Point Lepreaux automatic buoy, moored with 10 fathoms of wire and 40 fathoms of chain 1½-inch, and a granite anchor of 4,000 lbs.

Quaco Buoys.

Quaco Reef bell buoy, Quaco Ledge bell buoy, and Quaco shoal can buoy. were taken up from their respective positions by the steamer "Lansdowne" in December, and placed on the ballast wharf for the winter.

Southern Wolf Automatic Buoy.

This buoy was removed by the "Lansdowne" on the 24th November last; replaced by another buoy taken from St. John and moored in 52 fathoms of water with 35 fathoms of $1\frac{1}{2}$ -inch chain and 45 fathoms of $\frac{7}{8}$ -inch chain and a granite rock weighing 4,000 lbs., in the following position: from Head Harbour Light N.W. by W. $8\frac{1}{4}$ miles, and Lepreaux Light E. by N. $\frac{5}{8}$ N. $13\frac{1}{4}$ miles.

On the 7th May the "Lansdowne" placed the buoy in true position, moored with 25 fathoms of wire and 70 fathoms of 1 inch chain and a granite anchor of 4,000 lbs.

Split Rock Automatic Buoy.

This buoy was removed by the steamer "Lansdowne" on the 31st December last, and replaced by another buoy taken from St. John, and moored in 30 fathoms of water with 45 fathoms of $1\frac{1}{2}$ inch chain and a granite stone of 4,000 lbs., in the following position: S.W.S. $\frac{3}{4}$ S. from Musquash Light, S. $\frac{1}{2}$ W. from Western Head Musquash and W. S. W. from Partridge Island.

The buoy having been reported out of position on the 15th February, the tug "Storm King" with G. W. J. Bissett, master of the steamer "Lansdowne" on board, was despatched to the buoy, which was found greatly out of position. The buoy was towed into true position and left with whistle sounding all right. On the 17th of April, the "Lansdowne" proceeded to Musquash and found the buoy two miles out of position and replaced it in its proper place.

On May 4th, 1895, the "Lansdowne" replaced the buoy, moored with 20 fathoms of wire and 30 fathoms of chain $1\frac{1}{2}$ -inch and a granite stone 4,000 lbs.

PRINCE EDWARD ISLAND DIVISION.

This division is under the charge of Mr. Artemas Lord, provincial agent of the department, stationed at Charlottetown, and who has as assistant, Mr. Edward Hackett, Inspector of Fisheries. Mr. Milton Walsh, foreman of works and general repairs, is also under his direction.

The agent has expressed his satisfaction at the efficient aid rendered by the officials connected with the work of the agency.

There are in this division 56 lights and 35 stations and one steam fog-horn under the charge of 41 keepers. There are 3 automatic whistling buoys and 1 bell buoy. The majority of the lights are situated on headlands and serve the general purposes of navigation, the remainder being harbour lights intended particularly for the benefit of fishermen. Thirty-five harbours in this province are buoyed by the department under contract; the buoys being under the general supervision of the agent.

The several lighthouses were inspected either by the agent or Mr. Walsh, or by both of them, in the government schooner "Prince Edward," which also delivered

the lighthouse supplies. This vessel previous to going on her work was overhauled and repaired, and on the supply and inspection tour, the agent reports that the "Prince Edward" gave evidence of the thorough work done, by being perfectly tight and staunch in the worst weather met.

NEW AIDS TO NAVIGATION.

An additional range light was put in operation on the 1st June last on Fish Island, or Bill Hook Island, at the entrance to Malpeque Harbour, Richmond Bay.

The light is fixed red, elevated about 18 feet above high water mark, and visible over a small arc on each side of the line of range.

The light is shown from a lantern hoisted on a mast and ranges with the main light S. by E. $\frac{1}{2}$ E. to a black cask buoy at the entrance to the channel leading to Darnley Basin, and is intended as a guide for fishing boats using Darnley Basin, in which there is only 6 feet water at ordinary high tides, and forms no part of the regular light and buoy service for Malpeque Harbour.

Range Lights in Summerside Harbour.

Vessels entering Summerside and particularly the large ferry steamers, between Summerside and Nova Scotia, finding the entrance to Summerside Harbour under existing conditions at night difficult, a new light was put in operation on 5th September last to be used as a back range light in connection with the light on the railway wharf in Summerside harbour.

The light is fixed red, 165 feet above high water mark, and should be visible 8 miles in and over a small arc on each side of the line of range. The illuminating apparatus is catoptric.

The tower is a square, pyramidal wood open skeleton frame, having the front face boarded so as to form a day beacon, and painted white. It is surmounted by a square wooden lantern painted red, and is 56 feet high to the vane on the lantern.

This tower stands on the farm of Messrs. John and George Stavort, east of the town of Summerside, $\frac{3}{4}$ mile E. $\frac{1}{4}$ S. from the Summerside railway wharf light. At the same time, the wharf light which now forms the front light of this range, was changed in colour from fixed white to fixed red in the line of range, but continues to show fixed white as heretofore over the head of the wharf.

REPAIRS AND IMPROVEMENTS IN EXISTING STATIONS.

North Cape.

A new chain barrel and cog-wheel have been supplied this station, and put in by Messrs. McKinnon and McLean, of the Esdale Foundry. The remainder of the gear was thoroughly overhauled and cleaned by Mr. Walsh, and is working well.

Sandy Island.

The gales causing the sand to cut out, clay and brush were brought from the banks about Cascumpec wharfs, and spread around the foundation and seeded down after being levelled and graded from the building, the cost of this work amounting to \$37.50. The tank was also cemented and repaired, at a cost of \$11.75. A new boat was supplied, costing \$50, of this amount the department paid \$35, the keeper the balance, \$15.

Tignish River.

The foundation under the main tower being of wood, became rotten. A contract was given Captain J. Gallant to take out the timber and build a stone foundation at a cost of \$125, and a good and satisfactory job has been done.

North Rustico.

The site at this station being threatened by the sea, tenders for protection work were called for, and the contract let to Mr. Thomas G. Purser, the lowest tenderer.

One hundred feet of close piling was laid, tie beamed, brushed and ballasted, and a block of hemlock square timber 30 feet by 15 feet, 5 feet high, was erected and the main light tower placed thereon. The work cost \$515, with \$12 for extra timber and labour done outside the contract. The piles were cut 20 feet long, and driven from 8 to 12 feet into the ground.

East Point.

The fog-horns having got out of order in the spring, the machinery was overhauled and repaired by Mr. Esdale, foreman of Messrs. McKinnon & McLean, with the assistance of the assistant keeper at the station, Mr. Berge, at a cost of \$20.70.

St. Andrew's Point.

The tower at this station having been destroyed by fire in October, 1894, a new tower has been built by Mr. Edward Maher, under contract and under the immediate and constant supervision of Mr. Walsh, and is a satisfactory job, at a cost of \$357, and \$12 allowed for small extras. The lantern was constructed by Mr. Walsh, of 16 gauge galvanized sheet iron.

Cardigan River.

A new fence was put up under contract by Messrs. McLeod & Shaw, at a cost of \$90.

Cape Bear.

Considerable wood work repairs have been done at this station, which is now in good order. The cost of repairs amounted to \$110.86.

Wood Island.

Small wood repairs were done at this station, at a cost of \$52.

Sea Cow Head.

Kitchen chimney was rebuilt at a cost of \$40.

Crapaud Inner Light.

The beacon and mast attached to keeper's dwelling were removed and erected in the keeper's garden in the same line of range at a cost of \$16.90. The removal was made owing to damage done to keeper's dwelling, by strain on the beacon in gales.

Blockhouse Point.

Repairs have been made under the supervision of Mr. Walsh. The old roof of the dwelling was removed, the pitch was increased and the flat roof covered with No. 5 cotton duck. The clapboards were stripped off the north side of the tower and replaced by shingling—the corner casings were also removed and the corners shingled. Part of the south siding of the dwelling was removed and new boarding and shingles put on. The earth from the outside of the stone foundation was trenched out and a filling of puddling clay rammed down 2 feet deep and 2 feet wide from the wall, to stop the surface soakage which was affecting the cellar walls and keeping the cellar damp. The gutters were also attended to. The whole of the repairs at this station cost \$180.

Brighton Beach.

In order to render them more conspicuous as day beacons, a red diamond or lozenge, 20 feet deep by the width of the building, has been painted upon the side facing the channel of each of the lighthouse towers at Brighton Beach, in Charlottetown harbour. The lanterns are also painted red, and the remainder of the two buildings are left white as heretofore.

In addition to the above repairs, all ordinary painting and small repairs required for keeping the light stations in good condition, were done in the usual way.

BRITISH COLUMBIA LIGHTHOUSE DIVISION.

This division comprises all Canadian waters on the Pacific coast and is under the charge of Captain James Gaudin, agent of the department at Victoria, who also acts as inspector of lights.

There are in this province 16 light stations, five of which are steam fog-alarms, and at three others, bells rung by machinery. There are also two lantern lights on pile beacons in Victoria harbour, and two similar lights in Nanaimo harbour. The above are in charge of 16 light-keepers, some of whom supply assistance out of the salaries allowed.

The lights were supplied and buoys tended during the past season by the Dominion steamer "Quadra," Captain J. T. Walbran, master.

NEW AIDS TO NAVIGATION AND IMPROVEMENTS IN EXISTING AIDS.

Berens Island.

On the 1st May last the light shown from the tower on Berens Island in the entrance to Victoria harbour, was changed from fixed blue to occulting white. The new illuminating apparatus is dioptric of the sixth order.

Balfour.

A new light established at Balfour on the south side of the mouth of the left arm of Kootenay River, where it joins Kootenay Lake, was put in operation on the 1st April last.

The light is fixed white, shown from a seventh order dioptric lens lantern, hoisted on a post erected above high water mark, on the rocky shore, and the light is shown 20 feet above the highest water mark.

The post on which the light is hoisted has boxes to shelter the lantern at its top and at its base. The whole structure is painted white and is 25 feet high from the ground to the summit.

The light was erected under contract with Mr. Busk, the sum of \$29.50 being paid for laying the foundation and cutting down trees that obstructed the visibility of the light, and \$42.50 for the structure erected.

Portlock Point.

A lighthouse erected at Portlock Point, the north-east extremity of Prevost Island, Trincomatee Channel, off the east coast of Vancouver Island, was put in operation on the 1st November, 1895.

The light is fixed white, with a red sector over Enterprise Reef. It is elevated 72 feet above high water mark and should be visible 10 miles from all points of approach by water. The illuminating apparatus is dioptric of the seventh order.

The light building consists of a square pyramidal wooden tower, with kitchen attached, painted white, surmounted by a square wooden lantern, painted red. The tower is 48 feet high from base to vane.

The light is intended principally to guide up Swanson Channel to Active Pass and to guard Enterprise Reef.

The light was built under contract by Mr. G. A. Frost, for the sum of \$870.

Gallows Point Beacon.

The light shown from a red platform buoy off Gallows Point, Nanaimo Harbour, has been discontinued, and on the 15th April last a fixed red light was shown from a lantern on a beacon, on the edge of the flat on the south side of the channel, opposite and about one cable S. S. E. from the buoy which will be continued off Gallows Point, but will be unlighted.

The beacon is formed of a cluster of three piles, painted black.

The lantern stands on the top of the beacon at a height of 10 feet above high water mark, and it is expected that in consequence of the stability of the beacon the light will be more reliable than when it was on the buoy. The character of the light has not been changed.

Sand Head Beacon.

A black beacon composed of four piles, braced together at the top and surmounted by lattice work in the shape of a cone, has been established on the outer extremity or western edge of Robert's Bank, off the mouth of Fraser River. The beacon shows 12 feet above high water. The site dries at extremely low water.

Sturgeon Bank, North Beacon.

The most northerly of the beacons on Sturgeon Bank, off the mouth of the Fraser River, Gulf of Georgia, which had been carried away, has been replaced in its old position.

Shrub Island Beacon.

A small stone beacon surmounted by a wooden staff, with cross-pieces on its head, the woodwork painted red, and showing 8 feet above high water, has been erected on the end of the rocky ledge extending north-west from Shrub Islet, Metlah-Catlah Bay. The red spar buoy heretofore marking this point has been withdrawn.

Alford Reef Buoy.

The spar buoy marking Alford Reefs at the entrance to Metlah-Catlah Bay has been replaced by a large steel can buoy painted red.

Hodgson Reef Buoy.

The spar buoy marking Hodgson Reefs, off the north entrance to Duncan Bay, has been removed and replaced by a large steel can buoy painted red.

The buoys have all been relieved where necessary, cleaned and painted, and the moorings overhauled and renewed where necessary.

PRINCIPAL REPAIRS AT EXISTING STATIONS.

Cape Beale.

The damage done to the tramway last winter by falling trees has been repaired, and the boat and boat-house, which had been destroyed by the storms and high tides of last winter, have been replaced. There is now a good trail from Bamfield Creek to this station.

Carmanah.

The fog-alarm at this station is reported by mariners as being much more reliable than that of Tatoosh Island, on the south side of Fuca Strait. Daily notices of passing ships are posted at the telegraph offices in the province.

A new water tank, 20 ft. x 12 ft. x 6 ft., has been built to supply water for the fog-alarm. It has been found necessary to re-tube the boilers at a cost of \$150.

A new surf-boat has been supplied to replace a broken one. The boat landing has been cleared of the boulders, which kept rolling in in stormy weather.

Two sad accidents occurred during the past year. One of the keeper's sons was drowned a few miles from the station; another was killed while riding down the tramway on the car, the brakesman losing control of the car.

Race Rocks.

A slight expense was incurred in repairs to the boilers.

There is now a good landing place on the north side of the main island.

Fisgard.

A slight expense has been incurred in pointing and re-cementing the tower on the south-east and south-west sides. This station is built of brick, which is crumbling away through age on the sides most exposed to the weather. The cementing and pointing will prevent further decay for some time.

Discovery Island.

The foundations of the cylinder gave way last winter, and have been renewed under the superintendence of the chief engineer of the "Quadra."

Point Atkinson.

The deck surrounding the dwelling and tower has been renewed at a cost of \$70.

BUOYS AND BEACONS.

There are about 300 harbours, bays and sections of rivers buoyed in the Dominion of Canada. In most cases contracts for a period of three years have been entered into to maintain the buoy service. In some instances the buoys are placed by the harbour masters, who furnish accounts to the department for the work done and material supplied.

The large whistling and bell buoys maintained off the coasts of Nova Scotia, New Brunswick, British Columbia and Prince Edward Island, are attended to by Dominion steamers. The gas and other buoys above and below Quebec in the Quebec agency are also maintained by government steamers, but occasionally, tugs are employed when the steamers are not available. The large coast buoys maintained by the government steamers are specially referred to under the heading of each lighthouse division.

The expenditure in connection with the buoy service for the year ended 30th June, 1895, was as follows :

For the province of Quebec, including port of Montreal	\$28,716 47
Above Montreal, including Ontario.....	4,838 08
New Brunswick.....	10,679 04
Nova Scotia.....	16,156 72
British Columbia.....	3,880 96
Prince Edward Island.....	2,665 28
Total.....	<hr/> \$66,954 55

This includes the expenditure incurred in the construction of new automatic buoys.

OIL FOR THE USE OF LIGHTHOUSES.

The oil for lighthouse purposes has been purchased from the Imperial Oil Company of Petrolia, by contract, which was entered into on the 11th March, 1893, for a period of three years. Tenders were invited by public notice, and the lowest tender was accepted.

The quantity of oil supplied to the lights above Montreal by the Imperial Oil Company during the year 1895 was 20,605 gallons, imperial measure, which cost \$3,537.23 ; to the lights in Quebec district, 28,080 gallons, which cost \$4,813.12 ; to the Nova Scotia district, 37,083 gallons, costing \$8,153.33 ; to the New Brunswick district, 15,727 gallons, costing \$3,187.90 ; to the Prince Edward Island district 5,833 gallons, which cost \$1,341.66, making the total quantity purchased from the

Imperial Oil Company 107,328 gallons, and the total cost \$21,038.24. In addition to this the department purchased from the Standard Oil Company, of New York, 2,800 gallons of American oil for the New Brunswick district at a cost of 18½ cents per gallon, for the Nova Scotia district 7,000 gallons, at a cost of 18½ cents per gallon, for the district above Montreal, 1,650 gallons at the same price in New York. The freight was paid by the department.

The total quantity of American oil purchased was 11,450 gallons, wine measure. The quantity purchased for British Columbia to date, is 4,500 gallons of American oil.

The list of prices according to contract with the Imperial Oil Company is as follows:—

Delivered at	Per Gallon in Barrels.	Per Gallon in Cases.
	cts.	cts.
Sarnia.....	14½	19
Hamilton.....	15½	20½
Kingston.....	16½	21
Montreal.....	16½	21½
Quebec.....	17	21½
St. John, N.B.....	17½	22
Pictou, N.S.....	18	23
Halifax.....	17½	22
Charlottetown, P.E.I.....	18	23

DOMINION STEAMERS.

"NEWFIELD."

The "Newfield" was employed from the 1st of July until the 22nd of October, 1894, in delivering supplies to lighthouses, and in raising and overhauling coast buoys. On the 22nd of October, the vessel was placed under the control of the Public Works Department for the purpose of repairing and laying sub-marine cable in the Bay of Fundy. The steamer was engaged for a period of 25 days in cable service, and then was placed in the service of lighthouse inspection. On the 17th December, supplies were taken on board for Sable Island, and the vessel proceeded to the island and began delivering the supplies on the 20th. The "Newfield" returned to Halifax, and immediately resumed the work of inspection of lighthouses and buoys. This work was continued during the winter months. The steamer was placed under general repairs on the 26th May. It was deemed necessary to make some improvements on deck, and to supply a new funnel. Tenders were invited for the funnel, and the tender of Mr. Alexander Webber for \$375 being the lowest, was accepted. The work of repairs to the machinery was largely done by the engineers of the steamer, assisted by a few workmen, and the carpenter work and other repairs were made by the ship's carpenter, with the assistance of joiners. The repairs and improvements were completed on the 30th of June, and the steamer was again commissioned for lighthouse and buoy service.

"LANSDOWNE."

This steamer, as was stated in the report of last year, was extensively repaired in the spring of 1894, and improvements made which materially increased the usefulness of the vessel. She was engaged in the lighthouse and buoy service during the month of June, 1894, and on the 10th of July was placed in the Tidal Survey Service. This service was continued up to the 1st of October, 1894, when the steamer entered upon the work of delivering supplies to lighthouses in Nova Scotia. The "Lansdowne" continued in this service until the 1st of November, when she returned to St. John to resume her regular work in supplying lighthouses and adjusting the buoys on the coast of New Brunswick. This service ended for the season on the 20th of December, 1890, and the steamer was placed in winter quarters.

In January, 1895, the agent reported that the "Lansdowne" required ordinary repairs, and instructions were given to place the vessel on blocks in St. John Harbour. This was done on the 25th of March, and repairs made by the men belonging to the steamer, assisted by a few outside workmen. The hand gear for steering the "Lansdowne" was substituted by a set of steam steering gear purchased from Messrs. Caldwell & Co., of Glasgow, Scotland, at a cost, including freight, of about \$800. On the 16th of April, the vessel came off the blocks, and was then commissioned for lighthouse and buoy service, which work she was engaged in until the 20th of June, when she was placed in the Tidal Survey Service.

"STANLEY."

The "Stanley" was engaged in taking up the three coast buoys on the coast of Prince Edward Island on the 22nd of November, 1894. This steamer was advertised to enter upon the winter mail service on the 1st of December, and accordingly she left Charlottetown for Pictou on that date. This route was considered the most advantageous for passengers and freight until the 24th of December, but after that date the ice became so heavy in the approach to the Charlottetown Harbour, that the steamer was placed on the route between Georgetown and Pictou. Trips were made pretty regularly during the months of January and February, 1895. On the 25th of February the "Stanley" was laid up for the purpose of cleaning the boilers, that season of the year being considered the most suitable for laying up, owing to the great amount of heavy ice in the straits and the decrease of traffic. The trips between Georgetown and Pictou were resumed on the 11th of March, but were not so regular as in the former part of the season. The vessel remained on the route until the 16th of April when it was found advantageous to place her on the Charlottetown-Pictou route. The winter mail service ended on the 30th of April, and the "Stanley" was employed in placing the heavy buoys on the coast of Prince Edward Island and at Cape Tormentine.

The ordinary repairs were made to this steamer before she entered upon the Fishery Protection Service on the 8th of July, 1895. The earnings of the "Stanley" for the winter season of 1894-95 were \$9,266.92, and the cost of repairs and maintenance for the fiscal year was \$28,179.32. The passengers carried numbered 1,600. The winter mail service was attended to by this steamer up to the 8th of February and resumed on the 12th April, and continued for the remainder of the winter season

As the Post Office Department does not allow any remuneration for this work the steamer has not been credited with any sum for carrying mails.

"ABERDEEN."

The "Aberdeen" went to Sable Island on the 17th September, 1894, to take off the crew from the ss. "Nerito" which stranded on the island. The captain of the "Nerito" preferred remaining with his vessel and the "Aberdeen" proceeded to Pictou to engage in the service of supplying lights on the north shore of New Brunswick. This work was completed by the 30th September and the vessel was taken to Georgetown, Prince Edward Island, to engage in the Fishery Protection Service. The steamer remained in the Fishery Protection Service until the 23rd of November, 1894, when she was put in winter quarters at Halifax until the 5th of April. At that date the "Aberdeen" was placed in the slip at Dartmouth to paint the bottom. Additional steam heating apparatus was placed on board and the old apparatus repaired. The steamer was ready for service in Nova Scotia on the 7th of May, 1895, and continued supplying lights and adjusting coast buoys until the 25th of May, when she entered the Fishery Protection Service for a few days. She resumed the regular coast work on the 1st of June, but was occasionally required for Fishery Protection Service.

Owing to the "Alert" being unfit for the usual work of delivering supplies in the Quebec agency, the "Aberdeen" was sent to Quebec, to take on board supplies for the lighthouses in the Gulf and River St. Lawrence. The steamer arrived at Quebec on the 1st of July, 1895.

The "Aberdeen" being a new boat built specially for lighthouse and buoy service, reports were received from the agents indicating that the work engaged in by this steamer was satisfactorily and expeditiously performed. A full description of the "Aberdeen" and her appliances was given in the report of 1893-94.

"QUADRA."

This steamer was engaged in lighthouse service on the 3rd July, 1894, visiting Parry Bay for the purpose of landing a number of workmen at Race Rocks fog-alarm, to make repairs. Mr. Webber, of the meteorological service, was landed at Carmanah on the 9th of July to inspect the instruments. The steamer was engaged in various work, principally buoy and lighthouse service and fishery protection until the 15th of December, 1894, when she went out of commission. Repairs to machinery and hull were made during the interval between the 15th December and 1st April, 1895. On the latter date the vessel was put in commission and begun the work of attending to buoys, beacons and lighthouses. In the waters of the Pacific, the marine growth is rapid and it was deemed advisable to clean the bottom of the steamer and paint it, for protection. The vessel was placed in the Esquimalt graving dock for this purpose on the 16th of April. The lighthouse service was resumed on the 20th of the same month and continued until the 30th of April.

The Department of Interior previously applied for the service of the "Quadra" to engage in the Alaska Boundary survey and she was, in compliance with this request, placed at the service of the commissioner and entered upon the survey trip on the 30th of April; the steamer returned to Victoria on the 1st of June, about ten days

of the trip being taken up with marine service. The lighthouse service was resumed and supplies delivered, in which the vessel was engaged up to the 14th of June.

The department instructed the captain to enter upon a special service of patrolling the west coast of Vancouver Island, where Indian crews had given some trouble to the masters of sealing vessels in refusing to carry out their engagements, after shipping. This service was entered upon on the 15th of June, and was continued in connection with visiting lighthouses until the 30th of June, 1895.

“ALERT.”

As stated in the report of last year, the “Alert” was put out of commission on the 10th of September, 1894, being unfit for service.

This steamer was borrowed from Her Majesty’s Imperial Government in April, 1885, for the purposes of exploration in Hudson’s Bay and Strait. She was engaged two seasons in this work, and from 1887 was employed in any service for which the steamer was adapted.

The report to the Governor General in Council of the 29th November, 1894 indicated that the “Alert” was unfit for further use, and that the attention of Her Imperial Majesty’s Government be called to the fact that it was proposed to sell the vessel at auction. A copy of an Order in Council was despatched by His Excellency the Governor General to the Secretary of State for the Colonies, before the sale of the steamer. The Lords Commissioners of the Admiralty obtained a report from the Commander-in-Chief on the North American Station, to the effect that it was improbable that the “Alert” would be suitable for further use for the navy.

The Lords Commissioners requested that the proceeds of the sale become a credit to Imperial navy funds. The steamer was sold by public auction on the 2nd of July, 1895, to the highest bidder. The net proceeds amounted to \$3,962.59 and a bill of exchange for £814 4s. 7d. was forwarded through the usual channel to the Admiralty for the credit of the Imperial navy fund.

“DRUID.”

The “Druid” was engaged in buoy service on the 2nd July, 1894, and on the 9th entered the lighthouse service and loaded supplies for the lighthouses on Anticosti and in the Strait of Belle Isle. This steamer has been found too small to supply lights at the above mentioned localities, as she cannot carry sufficient cargo for supplying all the lights, but she has been very useful for delivering supplies to lights in the River St. Lawrence and for buoy service. The gas buoys have been satisfactorily attended to and other buoys generally placed by Government steamers, have been looked after by the “Druid.” The lighthouse and buoy service was continued by the steamer until the 30th of November, 1894, when the crew was paid off and the vessel left in winter quarters.

The “Druid” was taken from Louise Basin on the 20th of April, 1895, and was engaged in towing lightships to their stations, and afterwards was placed in the lighthouse and buoy service, in which she was engaged up to the 1st of July, 1895,

The following statement shows the expenditure for maintenance and repairs, and the receipts for the fiscal year ended 30th June, 1895.

Name.	Repairs.	Maintenance.	Total.	Receipts.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
General account		730 44	730 44	
"Alert"	178 44	8,558 15	8,736 59	
"Druid"	1,904 16	8,692 67	10,596 83	
"Newfield"	1,677 98	23,592 29	25,360 27	2,500 00
"Lansdowne"	3,363 83	19,512 64	22,886 47	
"Stanley"	5,691 12	22,488 20	28,179 32	9,266 92
"Quadra"	535 82	18,204 94	18,740 76	
"Aberdeen"	1,107 43	12,530 12	13,637 52	
"La Canadienne"	893 60	*	893 60	
"Sir James Douglas"		138 00	138 00	
	15,442 35	114,447 45	129,899 80	11,766 92

* The expenditure for maintenance of the "La Canadienne" is paid out of the Fishery Protection Service.

Expenditure \$129,899 80

Receipts..... 11,766 92

Excess of expenditure over receipts..... \$118,132 88

COST OF MAINTAINING LIGHTHOUSES AND DOMINION STEAMERS.

The following comparative statement shows the expenditure on account of maintenance of lighthouses and steam fog-whistles from the years 1883-84 to 1894-95, both inclusive. The method of auditing all accounts in the department before payment, has been followed of late years:—

Year.	No. of Lights.	No. of Fog-whistles.	No. of Fog-horns, Bell and Bombs.	Cost of Maintenance.
				\$ cts.
1883-84	597	23	10	456,868 33
1884-85	617	23	12	478,064 04
1885-86	625	23	16	505,929 27
1886-87	658	23	24	476,514 44
1887-88	664	23	27	464,471 75
1888-89	675	24	29	459,423 80
1889-90	705	23	32	434,802 10
1890-91	710	23	31	455,254 42
1891-92	741	22	56	445,140 16
1892-93	747	22	56	480,553 42
1893-94	755	22	58	470,549 27
1894-95	768	22	59	457,547 81

STATEMENT showing cost of maintaining Dominion steamers from 1884 to 1895.

Year.	Cost of Maintenance.	
	\$	cts.
1883-84.....	122,816	25
1884-85.....	148,864	26
1885-86.....	130,759	83
1886-87.....	141,424	42
1887-88.....	150,659	19
1888-89.....	126,629	33
1889-90.....	114,959	20
1890-91.....	111,437	03
1891-92.....	127,406	28
1892-93.....	146,521	77
1893-94.....	142,487	42
1894-95.....	129,899	80

ICE BOAT MAIL SERVICE.

This service began on the 8th February, 1895, when the "Stanley" ceased to make daily trips and was continued up to the 12th April, 1895, during which time the following work was performed :—

Number of mail bags carried	3,497 bags
Excise baggage carried	458 pounds
Express goods carried	76 do
Number of passengers hauled in the boats	9
Number of strap passengers carried	77

The expenditure for this service was \$6,138.18 and the total earnings amounted to \$206.08.

CERTIFICATES TO MASTERS AND MATES FOREIGN SEA-GOING.

The report of the chairman of the Board of Examiners of Masters and Mates of sea-going ships for the twelve months ending the 30th June, 1895, will appear as an appendix to this report.

During the fiscal year it will be seen by reference to the report in the appendix, the Board of Examiners have held meetings for the examination of candidates at the ports of Halifax, N.S., St. John, N.B., Quebec and Yarmouth, N.S. 100 candidates presented themselves for examination at the ports named; 84 succeeded in passing, while 16 failed. Of the 84 that passed 46 received certificates as master and 38 as mate.

The number of candidates who have passed and obtained sea-going certificates of competency as master or mate since the Act went into operation, viz., 16th September, 1871, to the 30th of June, 1895, is 3,181 and the fees paid for these certificates amounted to \$25,478.

The amount received for the renewal of certificates during the twelve months ended 30th June, 1895, was \$50.50.

In an appendix to this report a list will be found of all who have obtained certificates of competency and service either as master or mate, during the year ended 30th June last.

INLAND AND COASTING CERTIFICATES.

During the twelve months ended 30th June, 1895, the number of candidates in the Dominion who have passed and obtained masters' certificates of service is 51, and 15 certificates of service have been issued to mates; the amount paid for these certificates was \$392.

Applicants for certificates of competency as master number 191. Sixty-five applied for certificates of competency as mate, and the amount paid for these certificates was \$2,781. The amount received for renewed certificates of competency and service was \$33.50, making a total of \$3,206.50 received from masters' and mates' inland and coasting certificates.

A list of certificates issued during the twelve months ended 30th June, 1895, will be found in the supplement to this report.

The total amount of fees received on account of certificates of competency and service, sea-going and inland and coasting, during the fiscal year ended 30th June, 1895, amounted to \$3,974.50, and the amount in detail expended on account of this service will be seen by reference to Appendix No. 1, to this report, was \$2,758.29. The vote for this service was \$5,000, and the sum expended to the 30th June, 1895, \$2,758, leaving an unexpended balance of \$2,342.

The following statement shows the total receipts and expenditure on account of masters and mates since 1871:—

			Expenditure.	Receipts.
			\$ cts.	\$ cts.
For the fiscal year ended 30th June, 1871.			1,410 45	
do	do	1872.	4,312 07	1,344 00
do	do	1873.	6,466 18	4,963 00
do	do	1874.	4,520 19	2,095 00
do	do	1875.	5,696 62	2,715 00
do	do	1876.	4,672 08	2,021 87
do	do	1877.	4,050 00	1,740 50
do	do	1878.	4,249 76	1,296 50
do	do	1879.	4,250 12	1,334 50
do	do	1880.	4,253 43	1,547 00
do	do	1881.	3,888 41	1,333 50
do	do	1882.	3,965 19	1,152 50
do	do	1883.	4,021 20	1,314 00
do	do	1884.	3,909 59	9,437 50
do	do	1885.	4,324 15	2,897 00
do	do	1886.	5,245 28	2,152 00
do	do	1887.	4,855 93	2,172 00
do	do	1888.	5,060 96	3,220 80
do	do	1889.	4,381 04	2,202 00
do	do	1890.	4,117 83	2,186 00
do	do	1891.	4,255 24	2,586 00
do	do	1892.	4,363 88	2,194 00
do	do	1893.	4,116 99	2,484 00
do	do	1894.	3,721 33	2,907 04
do	do	1895.	3,758 29	3,974 50
Expenditure.....			107,866 26	62,125 21
Receipts.....			62,125 21	
Excess of expenditure over receipts.....			45,741 05	

WRECKS AND CASUALTIES.

The total number of casualties to British and Canadian sea-going vessels reported to the department, as having occurred in Canadian waters and to Canadian sea-going vessels in waters other than those of Canada, during the twelve months ended 30th June, 1895, was 247, representing a tonnage of 93,914 tons register, and the amount of loss both partial and total, to vessels and cargoes as far as ascertained, was \$767,536.

The number of lives reported lost in connection with these casualties was 54. A statement of the wrecks and casualties forms an appendix to this report.

SICK AND DISTRESSED MARINERS.

Under the provisions of chap. 76, Revised Statutes, a duty of two cents per ton register is levied on every vessel arriving in any port in the province of Quebec, Nova Scotia, New Brunswick, Prince Edward Island and British Columbia, the money thus collected forming "The Sick Mariners' Fund." Vessels of the burden of 100 tons and less, pay the duty once in each calendar year, and vessels of more than 100 tons, three times in each year.

By an amendment to this Act passed at the session of Parliament in 1896 50-51 Vic., chap. 40, it is provided that no vessel which is not registered in Canada and which is employed exclusively in fishing or on a fishing voyage, shall be subject to the payment of this duty.

The receipts for the fiscal year ended 30th June last, amounted to \$42,815.74, being a decrease of \$6,362.24, as compared with the preceding year. The increase or decrease in receipts of sick mariners' dues in the various provinces were as follows:—Nova Scotia, decrease, \$1,869.06; Quebec, decrease, \$3,836.98; New Brunswick, decrease, \$288.30; Prince Edward Island, increase, \$90.06; British Columbia, decrease, \$124.26.

The Sick Mariners' Act does not apply to the province of Ontario, and consequently no dues are collected from vessels in that province, although a small expenditure is incurred on account of sick seamen. An appropriation is made by Parliament, to cover the expenditure at Kingston and St. Catharines, where general hospitals have been established and sick seamen are attended. During the fiscal year ended the 30th June, sick seamen were paid for at a per diem rate of 90 cents. The amount paid to St. Catharines Hospital was \$256.50 for attendance on 8 sick seamen, 285 days.

In the province of Quebec the expenditure on account of sick seamen amounted to \$7,536.18, being \$281.40 more than the previous year. The total collections for the entire province amounted to \$11,287.33, being \$3,836.98 less than the previous year.

At the port of Montreal sick seamen are cared for at the General Hospital and at Notre Dame Hospital, under an arrangement made by the department, by which 90 cents per diem is paid for board and medical attendance of each seaman. The number of seamen admitted to the Montreal General Hospital was 171, and the number of days during which they received treatment and board was 1,650. The total

cost, including ambulance hire, being \$1,506. The amount paid the Notre Dame Hospital was \$976.50, for the treatment of 161 sick seamen, for a total number of 1,085 days.

Chicoutimi Hospital received 15 seamen, to whom medical treatment and board were given at a cost of \$680.40. The sick mariners' dues collected at the port of Montreal during the fiscal year ended 30th June amounted to \$3,249.14.

At the port of Quebec sick seamen were cared for at the Jeffery Hale and the Hotel Dieu Hospitals, the sum of 90 cents for each seaman is allowed in return for medical attendance and board. The sum paid the Jeffery Hale Hospital was \$1,568.70, where 118 men received treatment for a total number of 1,743 days. The sum of \$337.40 was paid the Hotel Dieu Hospital for attendance to 17 seamen 366 days. At Hotel Dieu de Lévis 5 seamen were treated 325 days, at a cost of \$292.50. The sick mariners' dues collected at Quebec amounted to \$5,832.82.

The expenditure on account of sick seamen in the province of New Brunswick for the fiscal year amounted to \$6,979.42 being less than the preceding year, and the collection of dues to \$9,172.72, or \$288.30 less than the previous year. Marine Hospitals have been maintained at Miramichi, Richibucto and Bathurst.

At the General Public Hospital at St. John, 284 seamen were treated 3,467 days at a cost of \$3,185.34.

At Miramichi, 41 seamen were admitted and received treatment 967 days at a cost of \$1,316.77.

At Richibucto, 2 seamen were admitted and received treatment for 50 days. The cost of maintaining the hospital was \$458.92.

At Bathurst, 8 seamen were in hospital, 349 days. The cost of maintaining the hospital during the year was \$592.20.

The St. Andrew's hospital is in charge of a matron, who is allowed to charge \$3 per week for boarding sick seamen. No salaries are paid in connection with the maintenance of the hospital. At the port of St. Andrews the expenditure was \$131.07.

The Sackville hospital has been leased to Mr. Bradford Carter for a term of years from 1892, at a nominal rental. The terms of the lease require Mr. Carter to keep the buildings in repair, and if the Department should require the hospital at any time, it is to be handed over on notice being given.

In the province of Nova Scotia, marine hospitals are maintained at the ports of Yarmouth, Pictou, Sydney, Lunenburg and Point Tupper. The total expenditure on account of sick seamen in the province of Nova Scotia, for the fiscal year, amounted to \$15,035.68, and the receipts to \$15,013.47.

The marine hospital at Yarmouth is located at Bunker's Island; 22 seamen were admitted during the year ended 30th June, who were treated 510 days, the expenditure for this purpose being \$472.16.

At Halifax, provision is made for the care of sick seamen at the Victoria General Hospital, under arrangements made with the managers, by which the sum of 90 cents per diem is allowed for board and medical attendance to sick seamen. The sum paid the managers of the hospital for board and medical treatment during the

past fiscal year was \$5,423.20. The number admitted was 280, and the number of days for which treatment is charged is 4,726.

At Lunenburg, 25 seamen were admitted and received medical treatment 778 days, the cost of maintaining the hospital being \$896.38.

At Pictou 10 seamen were admitted to the hospital, their total treatment being for 247 days; the sum paid in connection with maintaining the hospital was \$882.81.

At Sydney 72 seamen received medical treatment, the total number of days being 600, and the amount expended in maintaining the hospital was \$1,082.57.

At Point Tupper 17 seamen were admitted to the hospital, the total number of days for which they received treatment being 164, and the amount expended in connection with keeping the hospital was \$390.10.

In the province of Prince Edward Island the amount expended on account of sick and disabled seamen during the fiscal year was \$1,723.01, and the receipts from sick mariners' dues were \$550.60.

Sick seamen are cared for at the Charlottetown and Prince Edward Island hospitals, under arrangements made with the managers of these institutions, at the same rate that is paid to the public hospitals in other parts of the Dominion.

The Charlottetown hospital admitted 17 sick seamen, giving them treatment for 908 days; the amount paid was \$817.20.

At the Prince Edward hospital 6 men received medical treatment for a total number of 181 days. The sum of \$162.90 was paid to the managers for the fiscal year ended 30th June.

In the province of British Columbia the sum of \$4,872.30 was expended for sick and disabled seamen, while the receipts from the collection of sick mariners' dues amounted to \$6,791.62.

The marine hospital at Victoria has in attendance a medical superintendent with a salary of \$300 per annum, a keeper whose salary is \$500 per annum; he is also allowed a rate of \$5 per week for board and attendance of each seaman. The keeper procures fuel, light, bedding, etc., at his own expense. The number of seamen admitted to the hospital for the past year was 102, and the total number of days during which they received treatment was 1,328, and the sum expended was \$2,053.14.

At ports where no hospitals are established, in the province of Quebec, Nova Scotia, New Brunswick, British Columbia and Prince Edward Island, sick seamen are cared for under the direction of the chief officer of customs, when the vessels to which the seamen belong have paid dues according to law. A circular to collectors of customs was issued 7th February, 1891, permitting sick seamen to be attended at the port of arrival of a vessel, provided that the regular dues were previously paid at some port.

During the fiscal year the sum of \$2,185.96 was expended for shipwrecked and destitute seamen, under the provisions of the Sick and Distressed Mariners' Act. Of this sum \$1,133.35 was paid to Her Majesty's Imperial Government, to reimburse expenses incurred in caring for shipwrecked and distressed Canadian seamen, in foreign ports.

The total expenditure, by this department, on account of sick and disabled seamen, amounted to \$38,332.55, and the appropriation by Parliament for this service was \$38,500. The dues collected amounted to \$42,815.74. It will be seen that the receipts exceed the expenditure \$4,315.74.

The receipts and expenditure in connection with this service during the preceding 25 fiscal years were as follows :—

			Receipts.	Expenditure.
			\$ cts.	\$ cts.
For the fiscal year ended 30th June, 1869.			31,353 78	26,987 64
do do 1870.			31,410 46	27,029 34
do do 1871.			29,683 41	28,971 22
do do 1872.			34,911 64	34,947 60
do do 1873.			37,136 10	41,016 43
do do 1874.			41,500 16	59,778 90
do do 1875.			37,801 46	50,684 76
do do 1876.			41,287 66	48,828 49
do do 1877.			43,739 21	51,647 94
do do 1878.			44,665 07	43,780 90
do do 1879.			37,779 57	42,729 36
do do 1880.			42,523 20	42,160 91
do do 1881.			49,779 72	40,667 52
do do 1882.			45,951 47	39,359 11
do do 1883.			45,573 42	36,249 65
do do 1884.			48,667 07	39,553 58
do do 1885.			39,068 39	44,501 57
do do 1886.			40,848 05	50,377 62
do do 1887.			42,334 92	37,447 35
do do 1888.			41,669 64	36,447 85
do do 1889.			39,306 29	41,520 59
do do 1890.			47,881 75	41,729 11
do do 1891.			43,829 68	35,155 12
do do 1892.			45,381 92	33,498 83
do do 1893.			46,190 69	35,052 37
do do 1894.			49,105 40	38,403 94
do do 1895.			42,815 74	38,332 55
Total.			1,122,195 87	1,089,666 95
Deduct expenditure from receipts.			1,089,666 95	
Excess of receipts over expenditure.			32,528 92	

MERCHANT SHIPPING.

The returns from the Collectors of Customs in the Dominion are made up to the 31st of December in each year as required by law. The publication of this report, at the present date, precludes the possibility of giving the tonnage for 1895. The total number of vessels remaining on the register books of the Dominion on the 31st December, 1894, including old and new vessels, steamers and barges, was 7,245, measuring 869,624 register tonnage, being a decrease in the tonnage of 42,915 tons as compared with 1893. The number of steamers on the registry books on the same date was 1,640, with a gross tonnage of 240,906 tons. Assuming the average value to be \$30 per ton, the value of the registered tonnage of Canada on the 31st December last would be \$26,088,720.

The number of new vessels built and registered in the Dominion of Canada during the last year was 326, measuring 21,243 tons registered tonnage. / Estimating the value of the new tonnage at \$45 per ton, it gives a total value of \$955,935 for new vessels.

LONGITUDE OF MONTREAL.

By reference to previous reports it will be seen that arrangements were made for determining the exact longitude of Montreal. The question is one of importance and is necessary for the construction of reliable hydrographic and other charts. The report of Professor C. H. McLeod, Superintendent of McGill College Observatory, published as Appendix No. 16, p. 122, to the report of 1892, contains information respecting the observations in connection with the work.

The provisional longitude as published before is as follows :—

" Montreal (the pier of the transit instrument in the Observatory).....	4h. 54m. 18·7s.
" Canso (Hazel Hill; the pier near the office of the Commercial Cable Company).....	4h. 4m. 9·3s.
" Waterville (the pier near the office of the Commercial Cable Company).....	0h. 40m. 41·3s.

The following letter from Professor McLeod furnishes information as to the present stage of the work :

MCGILL COLLEGE OBSERVATORY,
MONTREAL, November 18th, 1895.

WILLIAM SMITH, Esq.,
Deputy Minister of Marine, etc.
Ottawa.

DEAR SIR,—I have to acknowledge your letters of November 2nd and 13th with reference to the final report on the Montreal longitude.

I have delayed reply in daily expectation of hearing from the Astronomer Royal. I regret to say, however, that I now have a telegram from Professor Turner, who co-operated with me in the work, in which he states that it will be impossible for the Astronomer Royal to give the final results of the longitudinal determination at present. I am not at all informed as to the cause of the very great delay that has occurred in completing the reductions of the Royal Observatory, but suppose it is owing to the pressure of routine work. I regret it exceedingly, but I am quite unable to do anything towards hastening the completion of the report.

I have written asking the Astronomer Royal to send me a letter, which I can transmit to you, to be published in your annual report, and hope that it may reach you in time.

I have the honour to be,

Yours truly,

C. H. McLEOD.

STEAMBOAT INSPECTION AND CERTIFICATES TO ENGINEERS.

The annual report for the year 1894 of the chairman of the board of inspection, forms an appendix to this report. The statement showing certificates granted to engineers of steamboats, together with a list of steam vessels inspected and steam vessels not inspected; number of passengers allowed to be carried in each passenger steamboat; steam vessels added to the list, and steamers lost or laid up or rendered unfit for service during the year, will be printed in the supplement.

The amount received during the last fiscal year on account of tonnage dues, inspection of steamboats and certificates to engineers was \$24,630.56, of which the

sum of \$23,771.56 was for tonnage dues and inspection fees, and \$859 for certificates to engineers. The expenditure for the fiscal year amounted to \$26,385.88, showing an excess of expenditure over receipts of \$1,755.32.

The following is a comparative statement of the receipts and expendinure:—

	Receipts.	Expenditures.
	\$ cts.	\$ cts.
For the fiscal year ended 30th June, 1870	12,521 29	7,379 18
do do 1871	10,369 96	8,321 00
do do 1872	11,710 43	8,500 00
do do 1873	15,412 75	11,205 54
do do 1874	15,603 19	10,291 58
do do 1875	15,011 90	12,199 81
do do 1876	13,811 24	13,081 86
do do 1877	15,858 42	12,073 01
do do 1878	12,431 25	13,228 28
do do 1879	12,331 16	13,076 46
do do 1880	15,424 02	11,854 34
do do 1881	16,905 49	12,211 65
do do 1882	15,277 78	14,835 97
do do 1883	12,577 36	16,209 02
do do 1884	15,371 79	21,893 28
do do 1885	13,343 66	23,235 04
do do 1886	14,087 76	21,775 57
do do 1887	12,701 20	22,837 80
do do 1888	12,550 14	21,430 45
do do 1889	12,576 18	22,313 03
do do 1890	19,859 18	20,989 52
do do 1891	21,644 72	22,183 76
do do 1892	20,994 84	22,736 59
do do 1893	25,295 35	24,386 95
do do 1894	24,835 47	25,961 36
do do 1895	24,630 56	26,385 88
	413,186 09	441,616 93
Deduct receipts from expenditure		413,186 09
Balance to debit of fund		28,430 84

The following list contains the names of the inspectors of boilers and machinery and hulls and equipment of steamboats, viz.:—

Name.	Position.	Address.
Edward Adams	Chairman of Board of Steamboat Inspection	Ottawa
M. P. McElhinney	Inspector of Hulls and Equipments	do
I. J. Olive	do do	St. John, N.B.
S. R. Hill	do do	Halifax, N.S.
William Evans	do do	Toronto, Ont.
Thos. Donnelly	do do	Kingston, do
P. D. Brunelle	do do	Quebec, P.Q.
R. Collister	do do	Victoria, B.C.
John Dodds	Inspector of Boilers and Machinery	Toronto, Ont.
J. Johnston	do do	do do
T. P. Thompson	do do	Kingston, Ont.
Wm. Laurie	do do	Montreal, P.Q.
L. Arpin	do do	do do
J. Samson	do do	Quebec, P.Q.
J. P. Esdaile	do do	Halifax, N.S.
H. L. Waring	do do	St. John, N.B.
J. A. Thomson	do do	Victoria, B.C.
C. E. Robertson	do do	Winnipeg, Man.

INSIDE SERVICE.

The following comprises the names of officials and employees, engaged in the inside service of the Department of Marine and Fisheries on the 30th June, 1895:

Name.	Rank.	Salary.
William Smith.....	Deputy Minister.....	\$ 3,600
John Hardie.....	Chief Clerk.....	2,400
S. P. Bauset.....	do.....	2,400
Wm. P. Anderson.....	Chief Engineer, General Supt. Lighthouses and Hydrographic Service.....	2,600
F. Gourdeau.....	Accountant.....	2,250
W. L. Magee.....	Chief Clerk.....	1,900
R. N. Venning.....	First class Clerk.....	1,650
W. J. Stewart.....	do do.....	1,650
W. H. Alexander.....	do do.....	1,600
M. P. McElhinney.....	do do.....	1,600
A. W. Owen.....	do do.....	1,500
C. Stanton.....	do do.....	1,500
J. S. Webster.....	Second class Clerk.....	1,400
J. B. Halkett.....	do do.....	1,400
J. B. Kent.....	do do.....	1,400
M. F. Walsh.....	do do.....	1,400
A. H. Belliveau.....	do do.....	1,350
C. F. Cox.....	do do.....	1,350
V. C. Nicholson.....	do do.....	1,300
W. W. Stumbles.....	do do.....	1,300
V. H. Steel.....	do do.....	1,300
A. Halkett.....	do do.....	1,200
F. H. Cunningham.....	do do.....	1,200
T. Aumond.....	Third class Clerk.....	1,000
J. A. Murray.....	do do.....	1,000
J. McClenaghan.....	do do.....	1,000
D. C. Campbell.....	do do.....	950
R. Roy.....	do do.....	930
B. F. Burnett.....	do do.....	900
B. H. Fraser.....	do do.....	850
W. A. Mackinson.....	do do.....	800
A. H. Guion.....	do do.....	800
F. Anderson.....	do do.....	700
J. F. Fraser.....	do do.....	625
J. W. Watson.....	do do.....	600
J. M. Lalonde.....	do do.....	600
W. C. Gordon.....	do do.....	550
E. W. Gilbert.....	do do.....	550
M. C. Doyle.....	do do.....	550
L. J. Burpee.....	do do.....	500
C. W. White.....	do do.....	450
John McCharles.....	do do.....	450
J. J. Skelly.....	do do.....	400
J. Morin.....	Messenger.....	500
J. A. Robertson.....	do.....	500
R. Archambault.....	do.....	500
E. McQuarrie.....	do.....	300

EXTRA CLERKS.

M. Lamouche	\$ 2 25 per diem.
R. E. Tyrwhitt	600 00 per annum.
W. L. Bance	450 00 do

OUTSIDE SERVICE, MARINE BRANCH.

The number of persons employed in the outside service on the 30th June, 1895, was as follows:—

Superintendent of lights and light-keepers, &c., in Ontario and above Montreal.....	168
Officers of agency in the city of Quebec and light-keepers, fog whistle-keepers, crews of light-ships, etc., at and below Montreal, in the province of Quebec.....	170
Agent, clerk, messenger, superintendent of lights, light-keepers, fog-whistle keepers, attendants at humane establishments, &c., in Nova Scotia.....	205
Agent, clerk, messenger, superintendent of lights, light-keepers, fog-whistle keepers, &c., in New Brunswick...	111
Agent and light-keepers in Prince Edward Island.....	42
Agent and light-keepers in British Columbia.....	16
Officers and crews of Dominion steamers and vessels including Fisheries Protection Service.....	352
Coxswains of life-boat.....	20
Inspectors of steamboats.....	20
Examiners of masters and mates, and clerk to chairman of board.....	17
Officers and servants in marine hospitals.....	23
Shipping masters.....	26
Harbour masters.....	199
Officers at observatories, meteorological observers, &c., receiving pay.....	145
Hydrographers and engineers at Ottawa.....	7
Receivers of wrecks.....	32
Wharfingers.....	126
Making a total of.....	1,679

For the previous year the number was 1,541. In addition to the 1,679 mentioned above there were 70 registrars of shipping, who act under the direction and control of this department, but are, at the same time, collectors of customs at the various ports of registration, and receive no salary or fee in their capacity as registrars. There are 93 measurers and surveyors of shipping throughout the Dominion, who act as officers of this department, and are remunerated from their fees of office, although, in addition to such office, many of them hold a position in the customs service. Also, in addition to the above, by Orders in Council of the 21st of April and 2nd of December, 1874, the chief officer of customs at each port in the provinces of Quebec, Nova Scotia, New Brunswick, British Columbia, and Prince Edward Island, where no separate shipping office has been established, is to be held and deemed a shipping master, is to receive the fees, make the yearly returns to this department, and act in that capacity under its directions.

From the above statement it will be seen that there are 145 officers of observatories, &c., who receive pay for the performance of their duties, but in addition thereto there is a large number of meteorological observers throughout the Dominion who give their services gratuitously.

METEOROLOGICAL SERVICE.

The report of the Meteorological Service and Magnetic Observatories forms an appendix to this report. Owing to the death of Mr. Carpmael in October, 1894, the position of director became vacant. Mr. R. F. Stupart, who had been in the service for a number of years and was next in rank to the late Mr. Carpmael, was promoted to the position of director at a salary of \$1,600 per annum. Mr. Stupart, in his report, states that the usefulness of the service has been increased in several directions. A monthly map has been published during the past year, and meteorological data supplied the Director of the Tidal Survey. In addition to the publication of weather forecasts furnished to leading newspapers of the Dominion, besides being posted at about 1,500 telegraph offices in Manitoba, Ontario, Quebec and the Maritime Provinces, a bulletin has been telegraphed each morning at 10.15, to harbour masters and other suitable persons on the lakes and Maritime Provinces. The bulletins have proved very useful and are now posted in twenty-eight different ports. By reference to the director's report it will be seen that sea-faring men and fishermen appreciate the forecasts, and are governed by them to a large extent when storms are predicted.

The demand from persons in Toronto and at a distance, for special forecasts continue to increase, and in all cases predictions have been furnished at once to those asking for them. Warnings of approaching storms were issued to railways.

The average number of inquiries regarding the weather, by telephone, at the Toronto office is about six per day. The number of inquiries by telegraph regarding the weather, from outside places in direct telegraph communication with the Toronto office is about ten per week.

No charge is made in Canada for inquiries.

The information relating to forecasts is given to the public gratuitously, and a display is made in conspicuous and public places in the various cities of the Dominion, of the forecasts.

MAGNETIC OBSERVATORIES.

The annual reports of the director of the Magnetic Observatory at Toronto and the observatories at Quebec, Montreal, Kingston and St. John, are annexed to the report on the Meteorological Service. The sum of \$3,220.16 was expended in connection with the Magnetic Observatory at Toronto, and \$500 each for the observatories at Kingston and Montreal. The total amount expended on account of meteorological and magnetic services for the past fiscal year was \$60,368.18

COASTING TRADE OF CANADA.

By the provisions of chapter 83, Consolidated Statutes of Canada, being an Act respecting the Coasting Trade of Canada, no goods or passengers can be carried by water from one port in Canada to another except in British ships, but the Governor in Council may, from time to time, declare that the Act shall not apply to ships or vessels of any foreign country in which British ships are admitted to the coasting

trade of such country, and to carry goods and passengers from one port or place to another in such country. The Parliament of Canada was empowered to pass the Act alluded to under the provisions of the Imperial Act, 32 Vic., chap. 11, intituled: "An Act for amending the Law relating to the Coasting Trade and Merchant Shipping in British Possessions," which came into operation in this country on its proclamation by the Governor General on the 23rd October, 1869.

It was ascertained that the following countries, viz.: Italy, Germany, the Netherlands, Sweden and Norway, Austro-Hungary, Denmark, Belgium and the Argentine Republic, allowed British ships or vessels to participate in their coasting trade on the same footing as their own national vessels—the ships of Italy by Order in Council of the 13th August, 1873; those of Germany by Order in Council of the 14th May, 1874; those of the Netherlands by Order in Council of the 9th September, 1874; those of Sweden and Norway by Order in Council of the 5th November, 1874; those of Austro-Hungary by Order in Council of the 1st June, 1876; those of Denmark by Order in Council of the 25th January, 1877; those of Belgium by Order in Council of the 30th September, 1879, and those of the Argentine Republic by Order in Council of the 18th May, 1881, were admitted to the coasting trade of Canada.

INSPECTION OF SHIPMENTS OF LIVE STOCK EXPORTED FROM CANADA.

A report from the inspectors forms an appendix to this report. It will be seen that the total number of cattle shipped in 1895 is greater than for the year 1894, the figures being 94,972 cattle for 1895 and 86,635 cattle, for 1894. The report of the inspectors shows a remarkable increase in the export of sheep and horses, the numbers being 210,607 sheep in 1895, and 139,780 in 1894, while the number of horses shipped in 1895 was 13,202, and in 1894 there were 5,623 shipped.

MESSENGER PIGEONS.

The report of Captain H. V. Kent, Royal Engineers, present superintendent of signals, at Halifax, on the messenger pigeon service, forms an appendix to this report. The efforts to establish a pigeon service between Sable Island and Halifax have not met with success. The loss of birds which were liberated from time to time, has been considerable, and the mortality from various causes was greater than in any year since the experiment was begun. It has been suggested by Captain Kent and the agent of this department at Halifax, that the chances of success would be greater if the service were established between Canso and Sable Island, instead of Halifax. The distance between Canso and Sable Island is about 90 miles, and between Halifax and Sable Island about 150.

This suggestion has been approved of, and correspondence has been begun on the subject, with a view of ascertaining the probable cost of establishing a loft at Canso or some place opposite Sable Island.

Major Cameron, of Kingston, who has supplied a large number of pigeons from year to year, is of the opinion that birds of a maturer age than those that have been experimented with, will give more satisfactory results. This advice and other suggestions will be followed, in order that a fair trial may be made in connection with the operations of those in charge of the service.

REMOVAL OF OBSTRUCTIONS TO NAVIGATION.

The sum of \$5,000 was appropriated by Parliament for the removal of obstructions to navigation. The sum of \$2,217.36 was expended.

An obstruction to navigation was caused in Crow Harbour, Nova Scotia, by the wreck of a schooner, owner unknown, which had been driven near Lobster Factory wharf by a gale. Tenders were invited for the removal of the wreck; the lowest tender being \$34, was accepted and the work was done according to contract.

The steam barge "Burlington" was sunk in Sandwich West, and an offer to remove the barge for the hull and wreckage was accepted. The work was satisfactorily done and reported on by the collector at Windsor.

The barge "Ark" which had been seized by the Customs Department, was stranded at Amherstburg, Ontario, and afterwards became an obstruction to navigation by drifting into the channel of the Detroit River. The Mullen-Gatfield Coal Company removed the obstruction in order to proceed with wharf building in the vicinity of the wreck.

The boiler of the old steamship "Monarch" which had been laying near the Eastern Gap entrance to Toronto harbour, was reported as an obstruction to vessels, and tenders for its removal were invited in May last. The most favourable tender was accepted, and the contractor has been at work, but no final report as to the complete removal of the boiler has been received.

CORRESPONDENCE.

The correspondence in the Marine Branch has steadily increased from year to year. The letters received during the financial year number about 14,500, not including returns from officers and accounts. The letters sent out numbered about 12,000, not including mere acknowledgments.

LEGISLATION.

The following Act was passed last session of Parliament, and the following important Orders in Council were issued during the year:—

An Act to amend chap. 10 of the Statutes of 1892 respecting the Harbour Commissioners of Three Rivers.

An Order in Council dated the 26th February, 1895, confirming the by-laws adopted by the Harbour Commissioners of Montreal.

An Order in Council dated the 10th of June, 1895, regulating space for cattle, while being conveyed on board vessels to Great Britain.

An Order in Council dated 28th May, 1894, regulating wharfage rates on government wharves, on deals exported from Canada.

An Order in Council dated the 9th May, 1895, proclaiming Cape Tormentine a port.

The Act above referred to was assented to 22nd July, 1895, and forms an appendix to this report.

I have the honour to be, sir,

Your most obedient servant,

WILLIAM SMITH,

Deputy Minister of Marine and Fisheries.

Department of Marine and Fisheries,
5th December, 1895.

APPENDIX No. I.

GENERAL SUMMARY of Expenditure for Fiscal Year ended June 30th, 1895.

Service.	Amount.	Total.
	\$ cts.	\$ cts.
Ocean and River Service—		
Purchase of new steamer "Aberdeen".....	39,761 84	
Maintenance and repairs to Dominion steamers.....	129,899 80	
Examinations of masters and mates.....	2,758 29	
Rewards for saving life.....	6,591 39	
Investigations into wrecks.....	351 15	
Canadian registration of shipping.....	207 40	
Tidal service.....	11,507 24	
Removal of obstructions in navigable rivers.....	2,217 36	
Winter mail service.....	6,138 18	
Manning of ships.....	500 00	
McDonald Bros.....	4,000 00	
Widow of late Archibald Warner.....	160 00	
		204,092 65
Lighthouse and Coast Service—		
Salaries and allowances of lightkeepers.....	200,569 80	
Agencies, rents and contingencies.....	16,442 50	
Maintenance and repairs to lights, &c.....	240,535 51	
Completion and construction of lights.....	12,219 29	
Signal service.....	5,311 74	
Repairs to wharves.....	824 38	
		475,903 22
Scientific Institutions—		
Observatory, Toronto.....	3,220 16	
do Kingston.....	500 00	
do Montreal.....	500 00	
Meteorological service.....	60,368 18	
Hydrographic surveys.....	12,653 28	
		77,241 62
Marine Hospitals, &c.—		
St. Catharines hospital.....	256 50	
Sick and disabled seamen.....	36,146 59	
Shipwrecked and distressed seamen.....	2,185 96	
Relief of distressed Canadians in foreign countries.....	7 30	
		38,596 35
Steamboat inspection.....		26,385 88
Cattle inspection.....		2,268 74
Salaries and disbursements of fishery overseers—		
Ontario.....	21,938 56	
Quebec.....	12,459 34	
New Brunswick.....	21,370 94	
Nova Scotia.....	23,555 38	
Prince Edward Island.....	3,796 58	
Manitoba.....	2,663 55	
North-west Territories.....	3,515 16	
British Columbia.....	6,218 74	
		95,518 25
Fishbreeding.....		39,730 93
Fishery Protection Service.....		100,207 29
Carried forward.....		1,059,944 93

GENERAL SUMMARY of Expenditure for Fiscal Year ended 30th June, 1895—*Concluded.*

Service.	Amount.	Total.
	\$ cts.	\$ cts.
Brought forward.....		1,059,944 93
Miscellaneous—		
Building fishways.....	1,939 05	
Legal expenses.....	8,730 31	
Canadian Fishery Exhibit.....	578 80	
Distributing fishing bounty.....	4,994 54	
Oyster culture.....	5,363 36	
International Fisheries Commission.....	2,000 00	
Licenses to United States fishing vessels.....	338 80	
George Gouley.....	675 00	
		24,619 86
Fishing bounty.....		159,999 42
Civil Government, contingencies.....	10,326 17	
do salaries.....	54,047 65	
		64,373 82
		1,308,938 03

APPENDIX No. 2.

STATEMENT of Revenue of Marine Department for the Fiscal Year ended 30th June,
1895.

Service.	Amount.
	\$ cts.
Casual Revenue (sale of shipping forms, \$107.35; sundries, \$7,765.67).....	7,873 02
Capes Mail Service.....	206 02
Dominion Steamers.....	9,328 72
Examination of Masters and Mates.....	3,974 50
Fines and Forfeitures.....	1,497 70
Harbours, Piers and Wharfs.....	9,150 78
Lighthouse and Coast Service.....	989 00
Steamboat Engineers' Certificates.....	23,771 56
Steamboat Inspection.....	42,815 74
Sick Mariners' Fund.....	99,557 04

APPENDIX No. 3.

ANNUAL REPORT OF THE CHIEF ENGINEER.

OTTAWA, 6th December, 1895.

WM. SMITH, Esq.,

Deputy Minister of Marine and Fisheries, Ottawa.

SIR,—I have the honour to submit a report of the work done in the technical branch of the Department of Marine and Fisheries during the past year.

This branch embraces all the technical work of the department at headquarters, including the construction and maintenance of lighthouses, lightships, fog-alarms, buoys and beacons, the supervision of construction and repairs to Dominion steamers; construction and repairs of life boats and life boat stations; the administration of the vote for the removal of wrecks and obstructions in navigable waters; tidal and current surveys; hydrographic surveys in Canadian waters; construction and repairs to fish hatcheries; engineering points in connection with the maintenance of fish passes; supervision of surveys of oyster beds; examination of applications for foreshore, wharf and water lots as they affect the interests of navigation; preparation and publication of notices to mariners and hydrographic notes, etc.

An important division of the technical work of the department, the Meteorological Service of Canada, is managed independently, with headquarters at Toronto.

AIDS TO NAVIGATION.

A large part of the work done by the regular staff of this office, is that in connection with the construction and maintenance of lights and other aids to navigation. The extent of this can be judged from the particulars in the annual report of the Deputy Minister. Plans and specifications for all important buildings and repairs are made here, or are submitted for approval by the several provincial officers. The following tabular statement shows the office work involved for the past 11 months, up to the 1st December instant.

Description of Drawing.	Received.	Designed.	Copied.
Surveys	29	1	33
Lighthouse towers and dwellings.....	1	4	61
Pole lights.....			4
Fog-alarms.....		3	12
Outbuildings.....	3	1	12
Detail sheets.....		4	8
Illuminating apparatus.....		1	2
Steamers.....		1	2
Indicator diagrams.....	1		14
Buoys and apparatus.....	2		8
Boilers and fittings.....	3		15
Machinery.....	2	1	43
Oyster areas.....			4
Charts under construction.....		2	
do of water levels in great lakes.....		2	3
do showing dangers to navigators.....	13		34
Miscellaneous.....	3	1	3
	57	21	258
Total drawings, &c.			336
Charts received and recorded.....			75
do and entered in chart books.....			18
Photographs received and recorded.....			86
Plans relating to foreshore applications.....			96
Specifications written.....			22
Notices to mariners and hydrographic notes issued (covering 112 localities).....			61

STAFF.

The department suffered a very great loss in the accidental death, by drowning, on the 1st August last, of Mr. C. F. Cox, Assistant Engineer. Mr. Cox was a man of extraordinary ability as an architect and a draughtsman, and his familiarity with lighthouse work was exceptionally great. The vacancy caused by Mr. Cox's death has been filled by the promotion to Assistant Engineer, of Mr. B. H. Fraser, a graduate of the Royal Military College, who has been a draughtsman in this branch since 1889. Mr. J. M. O'Hanly, a Dominion and Provincial land surveyor, has also been appointed as Assistant Engineer.

PERSONAL INSPECTIONS.

I was enabled during the past summer, to make a cursory and very imperfect examination into the maintenance of aids to navigation in English and Scotch waters, and found that in regard to illuminating apparatus, the United Kingdom is far in advance of Canada. Their lights have kept pace with every development of optical science, and to-day both the source of light and the apparatus for directing rays in needed directions are as perfect as it is known how to make them, almost irrespective of cost.

It would be useless for Canada to attempt to establish or maintain lights so powerful. Besides the great cost involved, a complete revision of our system of appointing and training light-keepers would be required before we could safely use such lamps as are now common in England, where at least three trained keepers are always appointed to each important station, and where a light is never left without a man watching it.

It is questionable whether any necessity exists in Canada for so great elaboration in lighting. Our atmosphere is generally clearer than that of England, and light-houses are fairly numerous on our coasts. In clear weather our lights can usually be picked up as soon as they rise above the horizon, and if, in thick weather, they are obscured much more easily than the English lights, it is admitted that in a dense fog even powerful lights are useless at distances sufficient to keep vessels out of danger.

The policy of contenting ourselves with fairly efficient lights and pushing forward an extension and improvement of all fog alarm stations is therefore advocated. The Trinity House of England has abandoned horns and whistles as fog-alarms in favour of sirens, and operate these by air instead of steam, and opportunity is desired for the study and comparative test of the merits of sirens, whistles and horns.

It seems impossible to convince mariners that sound signals are not so reliable as lights and that with varied conditions of atmosphere very different penetration will be obtained from the same signals. Ignorance of this fact has, in many instances, led to complaints against our fog-alarms, when, on investigation, it has been found that the alarm was in operation and in good order. This is a contingency which no care on the part of the department can overcome.

In October last, I inspected all the light stations on the Atlantic coast of Nova Scotia between Halifax and Yarmouth, and have submitted to the department reports suggesting improvements in illuminating apparatus for many of the lights in that district. The improvement usually takes the form of substituting dioptric apparatus for the old fashioned lamps and reflectors now in use. I hope that the saving of oil from the proposed changes will in a few years pay for the apparatus.

TIDAL OBSERVATION WORK.

During the past summer season Mr. Dawson, C. E., continued the work of observing tides and currents in the Gulf of St. Lawrence, the Dominion steamer "Lansdowne" having again been lent to the tidal survey for this purpose, for a period of three months. The tidal observations continue throughout the year.

Annexed hereto, "Inclosure B," is his report on the year's proceedings.

I have again to express regret that the small vote available prevents a more rapid prosecution of this important and practical work. Mr. Dawson is desirous, during the coming season, to determine tidal differences for intermediate ports with relation to stations already established; this cannot be done without a substantial increase in the vote. Results from the seven tide gauges now in operation are being received, but as considerable expense is involved in reducing the gauge readings to make them available for publication as tide tables, it has been necessary heretofore to postpone part of this work for lack of funds.

HYDROGRAPHIC SURVEY OF LAKE ERIE.

As indicated in last year's report, Mr. W. J. Stewart, with the steamer "Bayfield," was engaged during the past summer season, in surveying the north shore of Lake Erie. I submit, herewith, (inclosure A,) Mr. Stewart's annual report of work done.

Respectfully submitted,

WM. P. ANDERSON, *Chief Engineer.*

(INCLOSURE A.)

REPORT OF PROGRESS.

HYDROGRAPHIC SURVEY OF LAKE ERIE.

MARINE DEPARTMENT, OTTAWA, 5th November, 1895.

The Chief Engineer,

Department of Marine and Fisheries.

SIR,—I have the honour to report as follows on the survey under my charge, for the past year:—

The winter of 1894-95 was spent by my first assistant, Mr. F. Anderson, and myself, in plotting the work of the previous season, and in preparing the fair chart of "Nottawasaga Bay" for the engraver. This sheet will not be issued separately, but will be contained in the new general chart of Georgian Bay, that should be at hand before the next opening of navigation.

On 24th November, 1894, you instructed me to proceed with a re-survey of the Canadian shore of Lake Erie, or that portion of it unsurveyed by the United States Government in 1876.

On 1st May, the "Bayfield" left Owen Sound with a party, officers and crew, of 24, and proceeded to Lake Erie, arriving at Point Pelee at noon on Saturday the 4th. On the way down I called at South Bay, Grand Manitoulin Island for some large platform buoys, and then carried a line of soundings down Lake Huron to Nine-fathom Bank. As night came on upon arrival there, I did not continue the line farther.

In Lake St. Clair I spent half a day sounding around the "Dump," from the dredging for the new United States Government channel, and examined a channel to the southward of the same, as complaints had been made that the dump seriously interfered with local vessels trading between Chatham, Ont., and Windsor. I found that a good channel existed south of the "Dump," with 11 feet of water in it.

At Point Pelee I delayed four days, sounding and making inquiries about new shoals reported to exist there. Could find none, but was informed that several wrecks existed in the locality (whereabouts uncertain), and as the water is not very deep for many miles off the point, it is altogether probable that vessels have at times bumped against these sunken hulls, and the captains have reported shoals.

On the morning of the 8th I reached the point at which I had proposed to start the season's work proper. This was at a high sand bluff about 30 miles west of Long Point. Here in 1876 the United States Government had erected one of the main stations of their Coast and Geodetic Survey, and as the Canadian survey should connect, where possible, with the United States survey, it was important that a new station should be erected here. I regret to say that some Canadians have removed every reference post. After careful inquiry amongst those living in the vicinity, I was able to erect a station within a few feet at least of the old one. The United States Government left similar reference posts for stations at Long Point, near the mouth of Grand River, and at Sugar Loaf Hill (Port Colborne), all of which I was able to find, and in that way make use of their excellent geodetic work, causing us a large saving of money and time, and making our work more accurate than it otherwise could be with a small staff and inferior instruments. In no case can a purely hydrographic survey hope to be as accurate as a special geodetic survey.

I have assumed the positions of Sugar Loaf Hill, Mohawk Island light, a station near Grand River mouth, Long Point light and a station on Long Point, to be correct as laid down by the United States Coast and Geodetic Survey, and have filled in the shore between by a carefully executed triangulation, for which I erected much larger and more substantial towers for stations than have hitherto been used on the Canadian Hydrographical Survey.

I obtained some latitudes during the season, and measured a base line for comparisons, and the agreements were very satisfactory.

After coastlining and fixing the stations for 30 miles west and outside of Long Point, I confined myself to work between the inner bay of Long Point and Port Colborne, and have almost completed that portion. The boatwork was carried out from the shore to a safe distance outside shoal water, that is an average distance of $2\frac{1}{2}$ miles. Outside this ship sounding in deeper water was carried out to about 11 nautical miles from shore, or as far as objects could be distinguished on the shore.

The area carefully sounded over was 430 square miles, giving 955 nautical miles sounded by boats, and 920 nautical miles from the vessel. There were 85 nautical miles of shore line traversed.

The shore line of Lake Erie is unlike that of Georgian Bay, in that there are no islands, and only small indentations, but I found the portion examined this season fringed with dangerous reefs, often a long distance, 4 miles off shore. Whilst known reefs have been accurately charted, one very dangerous new reef has been discovered lying about 4 miles south of Nanticoke, and covered with only $7\frac{1}{2}$ feet of water.

The weather during June, July, August and September was very dry and free from gales, but not from fresh breezes, which greatly interfered with boat work on the lee shore. The absence of rain and strong winds left the atmosphere charged with haze and smoke, so that thick weather prevailed to a large extent. The months of May and October were uncommonly stormy.

While the level of the water in Lake Erie has been very low, and a very serious matter for the large craft now using the lakes, records show it has been as low in previous years, in the winters of 1868, 1872, and 1873. However at that time the low water was not a serious trouble, both because it occurred in the winter months, and because the vessels in use then, were of shallow draught. Most of the large vessels in use now were built during a long period of high water, when, also, the canals and harbours were improved. On these accounts we hear many complaints about the very low water, and the chances are that it will be lower than ever this coming winter. Various causes have been assigned for it; the clearing of the lands, and the unusually small rainfalls of late years, no doubt, being the principal causes. There is a theory advanced that the deepening of the outlets to the lakes has contributed to a serious loss of water, but whilst the inlets to Lake Erie have been deepened in late years, no outlets have been altered. On the above theory, the water of Lake Erie should have fallen less than that of any of the other lakes.

At Port Dover, during the past season, was inaugurated a line of ferry boats to run the year round, connecting the Grand Trunk system with the Pittsburg and

Shenango Railway, at Conneaut, and in this way deliver coal on cars into Canada. The venture seems to be running smoothly, and it will bring that part of Lake Erie into prominence, and no doubt necessitate some further improvements to the harbour of Port Dover.

Whilst in the neighbourhood I made some inquiries about Long Point, and was fortunate enough to see a chart made in 1818, by the late Admiral Bayfield, on which the present Long Point *Island* is shown as joined to the mainland. There is also a map of a large portion of North America by Joseph Bouchette, (1815) where the present "gap" is marked "portage." A chart by Mr. John Harris, R. A., (1839) shows a gap from the main part of Lake Erie to Inner Bay of Long Point. This gap was filled up in 1862, but afterwards dredged, whilst now it is practically closed again. Other gaps have been made by heavy seas in other parts of Long Point *Island*, but have been closed again by the Long Point Company, the owners of the land.

Observations, as usual, were conducted with a strong active compass, to ascertain the variation of the magnetic needle at various parts of the survey, and the results will shortly be sent to the Toronto Observatory and the Hydrographer of the Admiralty.

During the coming winter, my staff will prepare copies of the work done for the engraver, plot such work, and work up notes of various kinds of observations.

On October 23rd the "Bayfield" reached Port Dalhousie, and is laid up there for the winter.

I have the honour to be, sir,

Your most obedient servant

WM. J. STEWART.

(INCLOSURE B.)

REPORT OF PROGRESS.

SURVEY OF TIDES AND CURRENTS IN CANADIAN WATERS.

OTTAWA, 31st October, 1895.

WM. P. ANDERSON, Esq., C.E.,
Chief Engineer,

Department of Marine and Fisheries.

SIR,—I have the honour to submit the following report on the progress of the Survey of Tides and Currents in Canadian waters. In it I will endeavour to state fully the progress made in the extension of the system of tidal stations, and in the preparation and publication of Tide Tables; and also to describe the character of the current in the Strait of Belle Isle, and its relation to the Gulf of St. Lawrence in general, as some additional light has been thrown indirectly upon this, by the work of the present season. With regard to new results obtained this year in the survey of the currents, it will only be possible at this early date, immediately at the conclusion of the season, to give an outline of the work as undertaken. To this some notes of unusual directions of the current between the Gaspé coast and Anticosti are added, which may be of practical service in the meantime, until the results obtained can be fully worked out and made clear by suitable illustration.

TIDAL STATIONS AND OBSERVATIONS.

At the present date there are seven tidal stations in operation; and these are now supplied with a complete outfit of the necessary instruments. The recording instrument in use at all of these stations is the self-registering tide-gauge of Lord

Kelvin's design, to which some improvements have been added in the endeavour to meet our special requirements. These instruments give a continuous record of the tide, day and night throughout the year. (For description of these instruments see Annual Report, Department of Marine and Fisheries, for 1893; Appendix No. 4, page 33.) For the adjustment of these instruments it is necessary to have correct time, and also to obtain direct measurements from a plane of reference or datum.

At isolated stations, where the time cannot be otherwise obtained, diploidoscope; or meridian instruments have been erected, which give the exact time of the sun's meridian passage; or apparent noon. In this way the driving clock of the recording instrument can be correctly regulated; and the necessity for telegraphic time signals has been dispensed with. The other requirement is supplied by means of a sight gauge; which consists either of a graduated staff standing on a float, or of a metal tape attached to a float and passing over a pulley-wheel. The choice between these forms of sight gauge depends upon the range of the tide at each station; and they serve to give the direct measurement required from a datum plane of reference. Where the range of the tide is so great as to require a metal tape for the sight gauge, Chesterman's steel tapes have been used. These answer admirably in themselves, as they are so thin and light; but unfortunately, in sea water they rust through in a few months time, which has necessitated the frequent re-determination of the datum plane of reference. The divisions and figures on these tapes are marked by a process of etching, as the metal is too thin to engrave; and if any non-corrosive metal were substituted for steel, such as aluminium or nickel, the figures could not well be etched upon it. The attempt to protect the steel by lacquer or copper-plating has been only partially successful. A trial is now being made with a ribbon of German silver, with a small punched hole at each foot, which is marked by a stamped number. The divisions of the foot are read on a fixed vernier.

All of the stations are especially arranged for heating in winter to prevent the tide pipes from freezing. The heating is supplied by coal oil lamps or small oil stoves; and during the past year improvements have been made in the forms of lamps and burners used, with a view to greater efficiency and safety, as the lamps have to be kept burning throughout the night.

At stations where it is necessary to have a continuous barometric record, a barograph is provided. In some cases the records at present taken by the Meteorological Service, are sufficient for tidal purposes.

In the recording instrument now in use, the driving clock forms a part of the whole, and cannot be detached. Hence if anything goes wrong with the clock, the whole instrument has to be removed and forwarded to some city for repair. This has been the chief source of interruption to the record at the more isolated stations; especially at those with which there is no communication throughout the winter months. From extensive inquiry it appears that all the various patterns of instruments for recording the tide are made on this principle; and to avoid the inconvenience referred to, it will be necessary to design a new form of instrument in which the clock can be readily detached. When the clock has to be sent away for cleaning or repairs, it can then be replaced by another in a few minutes, without interruption to the record. At present, all the recording instruments are working satisfactorily, and they should continue to do so until this change in design can be made for the stations where it is required.

At some of the more exposed stations, much trouble has been given by the movement of the waves in rough weather, which is often so considerable as to record itself on the tidal diagram; and the tidal curve itself is thus complicated with wave motion. The inlet pipes which admit the water to the vertical tide pipes, were originally provided with finely perforated roses or strainers with a view to preventing this; but they have not served this purpose successfully. The further method was therefore tried, at St. Paul Island, of laying a long intake-pipe out along the bottom into deeper water, where the wave motion would naturally be less felt. This intake consists of a two-inch iron pipe with joints of rubber hose for flexibility in laying, and a special fitting by which to connect it under water with the lower end of the tide pipe. It is laid entirely below low water, and ends in a

depth of 18 feet; and yet it appears to have comparatively little effect in reducing the amount of the wave motion on the tidal diagram. Possibly in the severe storms of winter, it may be relatively of greater advantage. Even at Father Point, where the intake-pipe consists of 260 feet of three-inch pipe, continued by 140 feet of two-inch pipe, ending at a depth of 12 feet at low water, the wave motion is still perceptible on the tidal diagram in very rough weather. If such a pipe could be carried out into water of sufficient depth, it would no doubt secure the desired result; but there is usually a limit to the depth which it is practicable to reach. At Forteau Bay, where the tide gauge for the Strait of Belle Isle is situated, the bay itself freezes over, which keeps the water surface quiet during the winter gales, and thus obviates the greater part of the difficulty. The effect of the wave motion which still remains on the tidal diagram itself, it is necessary to eliminate by tracing a mean line to represent the actual tide curve.

The tide gauge at Father Point, which was incomplete at the date of last year's report, was not finished until late in the season, on account of the delays met with; but on the 17th of last December it was finally in working order. The difficulties were increased by the unusual severity of the gales in the fall, which destroyed repeatedly the temporary dams required in excavating the tide trench across the rocky foreshore. The intake-pipe in the tide trench was laid with much difficulty, as the winter was setting in. It was most important to finish the gauge then; because much of the work would have had to be done over again, if it had been allowed to remain incomplete until the spring.

The intake-pipe serves to lead the water for 260 feet across the foreshore to the tide well, which is situated at high water mark. It is laid at the level of ordinary low water; and between this level and extreme low water it acts by siphoning. This method was adopted to save excavating the tide trench to a greater depth below water, which would have been very expensive in the circumstances. The method has proved entirely satisfactory, as special precautions were taken. The pipe in the tide trench consists of sound spruce and fir logs with a bore of three inches, and these were laid green to prevent shrinkage or cracking, and the lengths were carefully jointed with sail cloth saturated with white lead. Special air pipes were also connected with the main pipe, and furnished with taps to allow the air to escape, in order to keep the pipe constantly filled with water, and thus to insure the action of the siphon. As the sea surges heavily into the outer end of the tide trench in rough weather, and the water then is much mixed up with air, a further precaution was taken to prevent the air from entering the pipe. A two-inch iron pipe was laid out along the bottom for 140 feet from the end of the wooden pipe, extending into 12 feet depth at low water. Any air which still finds its way into the intake-pipe is allowed to escape by opening the air taps at high water.

This spring, an ice shove of 20 feet in height formed along the outer edge of the rocky foreshore. This carried away the iron pipe; but it is so arranged as to be easily relaid; and the end of the wooden pipe itself is protected by a permanent cement dam across the outer end of the tide trench in the rock.

An additional tide gauge has been erected this season at Halifax. It has been placed at the north wharf, on the property of the Department of Marine and Fisheries. This site has the advantage of being in close proximity to Her Majesty's Dock Yard, where the old tidal records of 1860 and 1861 were obtained, from which the tide tables for Halifax are at present calculated. This will bring the new observations into direct relation with the old ones; which is important until it can be ascertained whether the accumulation of the tide in Bedford Basin has any influence on the tide in Halifax Harbour itself, as compared with the tide on the open Atlantic coast in the vicinity. As the range of the tide is only about 6 feet, it is probable that any such local influence will prove to be inappreciable.

During the past year the only serious interruption to the tidal records occurred at St. Paul Island, where the tide gauge was partially destroyed by the unprecedented gale of the 11th of February. This gale amounted to a hurricane in violence, and along the adjoining coast of Cape Breton buildings were carried away which were thought to be well beyond the reach of the sea. The tide gauge at St.

Paul Island was built in a sheltered recess in the cliffs, and was held in place by crib-work, set between the cliffs, and braced above by beams mortised into the rock at both ends. The crib-work and the lower parts of the bracing withstood the storm, but the tide-house, which was set at 12 feet above high water, was carried away and the recording instrument lost. A spare recording instrument was at once sent to the makers in Glasgow for alteration, to adapt it to that station. In making the repairs this season the new tide-house was set at a higher level, and it now stands at 23 feet above high water; and the bracing was also extended and strengthened, which should make the tide gauge secure against further injury.

The tide gauge at Grindstone, Magdalen Island, was removed this season, and the materials used in the erection of the new gauge at Halifax. The tide at the Magdalen Islands proved to have a very small range; so much so that it was often difficult for days together to make out the time of high and low water with any certainty, especially at the neap tides. This may possibly be due in part to the disturbing effect of the wind, which is relatively large when the tide itself has so small a range, but it also illustrates the remarkable fact that the tide-wave, which enters the Gulf of St. Lawrence from the Atlantic through Cabot Strait, between Cape Breton and Newfoundland, spreads out in the interior of the gulf so as to become almost inappreciable, till at the opposite side, between Gaspé and Anticosti, it regains its original range and proceeds up the St. Lawrence to Quebec, with ever increasing height. In these circumstances the persevering efforts which have been made to maintain a tide gauge on St. Paul Island, in Cabot Strait itself, are fully justified; as this gauge gives the desired results to better advantage than it is possible to obtain them at the Magdalen Islands, where the only compensating advantage is the hope of better shelter.

At Anticosti the only improvement required in the tide gauge was the new form of inlet by which the water is admitted to the tide pipes. The present inlet has worked satisfactorily during the summer months, but the change was necessary before the winter heating was commenced.

In the erection of the new tide gauge at Halifax, and the repairs at St. Paul Island and Anticosti, the superintendence of the work was intrusted to Captain Douglas, R.N.R., who gave his personal attention to it.

The seven tide gauges now in operation are as follows:—

I. *St. John, N.B.*—Gauge situated at Reed's Wharf in St. John Harbour. To furnish a basis for tide tables for this harbour, and also to serve as a reference station for the Bay of Fundy. Range of tide: springs, 26 feet, neaps, 20 feet. Observer, D. L. Hutchinson, director of the St. John Observatory.

II. *Halifax, N.S.*—Gauge situated at the wharf of the Department of Marine and Fisheries. To furnish a basis for tide tables, and also to serve as a reference station for the Atlantic Coast. Range of tide: springs, 7 feet, neaps, 4 feet. Observer, C. Bryant, foreman shipwright, H. M. Dock Yard.

III. *St. Paul Island, C.B.*—Gauge situated at Atlantic Cove, on the east side of the island. To command Cabot Strait, the main passage by which the tides enter the Gulf of St. Lawrence from the Atlantic. Range of tide: springs, 4 feet, neaps, 2 feet. Observer, J. McLeod, superintendent St. Paul Island.

IV. *Strait of Belle Isle.*—Gauge situated at Forteau Bay, at the inner end of the strait. To command this entrance to the Gulf of St. Lawrence, and also to bring the currents in the Strait into relation with the tides. Range of tide: springs, 5 feet, neaps, 3 feet. Observer, A. Hart, Forteau Bay.

V. *Anticosti.*—Gauge situated at South-west Point. To command the entrance to the St. Lawrence. Range of tide: springs, 7 feet, neaps, 4 feet. Observer, H. Pope, light-keeper and meteorological observer.

VI. *Father Point.*—This gauge is at the pilot station, and at the head of the deep channel of 150 fathoms which extends up the Lower St. Lawrence from the gulf. It serves also as an intermediate station between Anticosti and Quebec. Range of tide: springs, 13 feet, neaps, 7 feet. Observer, J. McWilliams, meteorological observer and signal officer.

VII. *Quebec*.—Gauge situated at the dry dock, Lévis. To furnish a basis for tide tables for Quebec Harbour, and with reference to depth of water in the St. Lawrence Ship Channel. Range of tide: springs, 17 feet, neaps, 12 feet. Observer, U. Valiquet, resident engineer, Lévis Dry Dock.

These tidal stations also serve to furnish the tidal data required in making the survey of the currents. The tide gauges at Father Point and Anticosti have also proved of service to the Department of Public Works in connection with the determination of mean sea level, which Mr. R. Steckel of that department is now making for the purposes of the general geodetic survey.

This season, tidal observations were also taken for three months at Picton, N.S., Neguac, N.B., and Bonne Bay, Nfld., as a tentative measure, to ascertain in what way tidal differences throughout the Gulf of St. Lawrence can best be obtained in relation to the above principal stations.

TIDE TABLES, RECORDS, AND PUBLICATION.

The record obtained from the self-registering tide gauge at Quebec was found to be sufficiently extended to serve for the calculation of tide tables for that harbour. The record from November, 1893, to January, 1895, or a little over a full year, was carefully tabulated and reduced to datum; and any exceptionally high or low tides due to storms were eliminated. The digest thus prepared from the record was transmitted to the Nautical Almanac Office, London, where the best possible advantages exist for the analysis and computation of the tides. Tide tables for both Quebec and Halifax for 1896 have there been prepared by Mr. E. Roberts, by the aid of the tide-predicting machine designed primarily for the prediction of the tides in India.

The Halifax tables are based at present upon old records taken at Her Majesty's Dock Yard during the years 1860 and 1861. There exist also still older records, obtained at the same site in 1851 and 1852, which it is very desirable to incorporate with those from which the tide tables are now calculated, in order to extend the basis on which they rest, and thus to make the tables more accurate. It has not been possible to do this, however, for lack of funds; and another year must therefore pass before this advantage can be obtained.

Since 1891 tide tables for Halifax have been issued by this department, in the form of a small booklet; but it has not been possible to obtain adequate circulation for them in this form. It has therefore been decided to supply the tide tables direct to the leading almanacs, without charge; in the endeavour to make them widely available to masters of vessels and to the pilot service. The tide tables for both Halifax and Quebec for 1896 have accordingly been supplied to the Canadian Almanac, published in Toronto; to the Star Almanac, published in Montreal; and also to Greenwood's Nautical Almanac, an English publication in which tidal information for all parts of the world is given. The tide tables for Quebec will also be issued by the Harbour Commissioners of Montreal, especially for the Pilot service; and the Halifax tables have also been supplied to Cogswell's Almanac, in which the information is principally for the province of Nova Scotia itself. With these tables, tidal differences are given which extend their application to the Atlantic coast of Nova Scotia, and to the Lower St. Lawrence respectively.

It is to be noted that such tide tables as have been published in the past, have been based upon a fixed difference from some distant port, usually on the other side of the Atlantic; and consequently they have been very much in error, especially at certain parts of the lunar month. This will therefore be the first time that tide tables are published for any Canadian port which are based upon direct observation; the only exception being the booklet above mentioned, issued since 1891. These tables also give the height of the tide as well as the time of high and low water. This is very important with reference to the depth of water in the St. Lawrence Ship Channel; and also to show the depth of water available at any tide for vessels entering the dry docks at Lévis and Halifax.

In reducing the tidal observations to a definite plane of reference, great difficulty has been experienced from the want of satisfactory datum levels in our cities. In St. John, N. B., there are no reference marks extant, or any other means of determining correctly at the present time the original low water level on which the Admiralty chart of the harbour is based; nor the low water level adopted for the more recent survey of the harbour by the Department of Public Works. A satisfactory low water datum must therefore be determined afresh, by means of the tidal observations now in progress. At Quebec the bench mark still exists, which was cut on the building of the Department of Marine and Fisheries at the time that the Admiralty surveys were made. The height of the tide in the present tide tables is therefore referred to the original low water datum of the Admiralty chart. This is of direct practical importance to shipping; as the tide tables thus show at once the depth of water which may be counted upon in addition to the soundings given on the chart. In obtaining this result, advantage was taken of the geodetic levelling done by Mr. Steckel, by which the levels have been carried across the river from the old Admiralty bench mark to the dry dock at Lévis, on which the tide gauge stands. At Halifax, three datum planes exist; as the city datum and the Royal Engineers' datum are both of them distinct from the Admiralty datum. The tides will be brought into closer relation with the Admiralty datum as the new observations proceed.

A sufficient record at St. John, N. B., has now been obtained to warrant its use for the calculation of tide tables for that harbour. If it had been possible to afford the necessary outlay for the reduction of this record, tide tables might also have been prepared for St. John for 1896.

Facsimile copies of the records from two tide gauges erected on the Pacific Coast by the Department of Public Works, are regularly transmitted to this office through the kindness of Mr. L. Coste, chief engineer of that department. These records are obtained at Victoria, B.C., and in the Strait of Georgia, at the mouth of the Fraser River. They are being kept on file until the records themselves are sufficiently extended, and funds are made available, to enable them to be used for the preparation of tide tables.

It is very important that tidal differences should be determined at once for other points, with reference to the principal stations at present in operation; but unless more money is made available for the purposes of this survey, it will only be possible to extend the work and to improve the accuracy of the tide tables by very slow degrees.

SURVEY OF THE CURRENTS.

In commencing the survey of the currents last season in the Gulf of St. Lawrence, one of the most important objects at the outset was to ascertain whether any general current existed across the width of the gulf; or what general circulation there was in the gulf area as a whole. With this knowledge as a basis, the nature of the currents in any special region could then be investigated with intelligence, and with greater hope of success. The main lines across the gulf on which it appeared most probable that some such general current might be found, also coincided with some of the more important steamship routes, which gave additional importance to their examination. Accordingly, during last season (1894) the currents were examined in the two main entrances to the gulf, at Belle Isle and off Cape Breton, to ascertain whether any continuous current passed through the gulf to the west of Newfoundland. No evidence of a general current in this direction could be found; while the indications off Cape Breton pointed to the greater probability of a general current across the gulf in the other direction, namely, on a line from the mouth of the St. Lawrence at Gaspé past Cape Breton into the Atlantic. This was investigated during the present season (1895) and much information was also obtained regarding the currents between the Gaspé coast and the island of Anticosti.

As the work of these two seasons has thus had the same general object for one of its purposes, it will come within the scope of the present report to include an outline of last season's results. Also by repeating the substance of the information with regard to the Strait of Belle Isle, a more extensive circulation can be given to it; as it appears necessary to place more reliance upon the direct circulation of these reports. The results of last season's work were communicated to the Hydrographer of the Admiralty, and to the United States Hydrographic Office; but it requires time before the information can be introduced into new editions of the Sailing Directions, and so reach the commanders of vessels interested. Copies of the report were also sent to the managers of the leading steamship companies; but such wrecks as the ss. "Mexico," ss. "Dracona," and ss. "Mariposa," which have occurred this season, so far as they may be attributable to the currents, show the need of making still more widely known if possible whatever information regarding the currents is obtained by means of this survey.

CURRENT IN THE STRAIT OF BELLE ISLE.

This strait has a width of 10 to 12 miles for 35 miles of its length; and is entirely free from any rock or shoal throughout. It lies east and west (magnetic). The north shore is bold and the water off it is deep; the south shore is low, but dips off rapidly into about 30 fathoms.

There has been a wide-spread impression that the current in the Strait of Belle Isle runs constantly inwards. A branch from the Arctic current which runs southward along the outer coast of Labrador, has been supposed to run into the Gulf of St. Lawrence through the Strait of Belle Isle, and to find its way out again through Cabot Strait, between Cape Breton and Newfoundland into the Atlantic. On some physical maps, and also on the weather charts issued by the Meteorological Service, this is definitely represented. The description given in the latest edition of the Sailing Directions (1894) although less positive than formerly, still favours this view. It is there stated:—"Under ordinary conditions of wind and weather a current enters the Strait of Belle Isle and flows westward.....but with south-west gales the current may be reversed." The remark on the Admiralty chart is, however, as follows:—"The movements of the water in Belle Isle Strait are made up of a general westerly set affected by tidal streams and winds. The resulting set may be in either direction." This remark gives little countenance to the theory of a constant inward flow; and is in itself sufficiently non-committal to cover almost any conditions. There is no attempt made, however, to describe the conditions under which the flow in either direction may take place.

On the other hand the fishermen along the coast seem to believe that the current is usually in the same direction as the prevailing wind at the time. From the report on the wreck of the ss. "Mexico" this season on Belle Isle, its loss appears to have been due to the over-running of its reckoning in proceeding eastward through the Strait of Belle Isle, which shows that the current sometimes runs in that direction. It was already explained in the report of this survey for last year, that the current runs through the Strait of Belle Isle in both directions, and that there are times when it may be nearly as strong in the outward direction from the west, as inward from the east.

The idea of a constant inward flow appears to be based on the drift of icebergs, and as they are most usually seen drifting inwards, it has been inferred that this is the constant direction of the current. The converse of this is, however, much nearer the truth; and it may be stated in general, that when icebergs are numerous at the outer end of the Strait of Belle Isle, and are also found within the strait, this indicates that the direction of the current has been predominantly inwards from the east during the few days previous, while the absence of icebergs indicates a current predominantly outwards from the west. This of course refers to the presence or absence, in the strait, of floating bergs, and not to bergs which may be aground near either shore. It may also be noted that only a very small percentage of the bergs off the outer end of the strait ever enter it. Captain Vaughan, who resided

four years on Belle Isle, states in a pamphlet on the subject that for ten icebergs which enter the strait, there are fifty that pass the mouth and go southward. In doing so they follow the general drift of the Arctic current which passes Belle Isle; and the larger bergs also ground at the entrance to the strait.

It may be stated in general terms that the current in the Strait of Belle Isle was found to be fundamentally a tidal one. The best comparisons of the current with the tide showed a complete correspondence between the two, especially in moderate weather and during the prevalence of moderate westerly winds. On such occasions there were several days during which the current ran east and west for an equal length of time in each direction and turned regularly in correspondence with the rise and fall of the tide. This may therefore be considered as the normal condition of the current. With a heavy and long continued wind the current would first run for a longer time with it and a shorter time against it; and eventually would run continuously in the same direction as the wind, with a fluctuation in velocity corresponding to the tide. This continuous current might be in either direction according to the direction of the wind.

In this strait also, where the range of the tide is only about four feet, and the current seldom exceeds two knots per hour, the effect of the wind upon the current is all the more marked in proportion. It must not be too hastily assumed however that the wind alone is the cause of the movement of the water in the same direction, as it appears probable that the tendency of the current to flow in the same direction as the wind, is due to the combined influence of the wind itself, and to difference in barometric pressure over wide areas.

CURRENTS IN THE STRAIT AS OBSERVED IN 1894.

The current in the Strait of Belle Isle was examined in both July and September, at the narrowest part of the strait near Amour Point. To avoid the tide rips which occur off this point, a section line was chosen a little to the eastward, on a line from Green Island, at the south side, to the red cliffs on the north shore, which lie immediately east of Loup Bay. The width of the strait is there $11\frac{1}{2}$ miles; and three stations were chosen on this section. The usual depth is 30 to 40 fathoms; but the water is much deeper near the north shore. The bottom appears to be bare rock running in ridges parallel with the direction of the strait. The surveying steamer was anchored at these stations for one or two days at a time; and was moved from one to another to ascertain any difference in the current at the two sides of the strait, while the same conditions of wind and weather prevailed. The tides were observed simultaneously at Forteau Bay within 12 miles of these stations, in order to ascertain the relation between the rise and fall of the tide and the direction of the current in the strait.

Comparisons of the current on the north and south sides of the strait were made by the best means available, to detect any difference between them. The best simultaneous observation of the currents on the two sides was obtained on September 15th, while the steamer was anchored three miles off Green Island, and an iceberg was drifting up and down with the tide, four miles from the north shore. At that time the current was running east and west in fair harmony with the tides; and complete data were obtained from the iceberg, as its height was measured immediately afterwards. This observation showed that the current on the north side of the strait ran inwards from the east for a longer time than on the south side, and outwards from the west for a shorter time. Also, on the north side, the current from the east, as shown by the path of the iceberg, was stronger than the current from the west, while on the south side the currents were practically equal in the two directions. On another occasion, during a period of persistent current from the east (September 8th), observations made while the steamer was at anchor near the north side, compared with the speed of icebergs near the south shore, showed that the current was practically equal at the two sides of the strait.

From these observations, and also from a comparison of the current as measured successively at the different stations, it appears that there is on the whole a tendency

on the south side to greater tidal regularity, and on the north side to greater persistency of flow in one direction or the other. This is probably due to the greater depth on the north side, and consequently, the greater momentum of the water there, as compared with the frictional resistance.

With this explanation regarding the amount of difference in the current on the two sides of the strait, we may proceed to a closer comparison of the relation between the tides and currents, based upon observations during such times as the current ran in harmony with the tides, and turned in regular correspondence with them. Also, the best instances that were observed of a persistent or predominant current for several days, from the east or west respectively, and the conditions under which this took place.

The tide itself, as recorded at Forteau Bay, had a range which did not exceed five feet. The difference between the spring and neap tides was not very marked; while on the other hand, when the moon's declination was great, the diurnal inequality in the tides was quite distinct. The currents in the strait showed the same characteristics; there was little appreciable difference in the velocity at spring and neap tides, as the currents were much more disturbed by the winds than any such difference would amount to. But the diurnal inequality in the current was well marked when this inequality occurred in the tide itself. The greatest velocity of the current in either direction under ordinary conditions of tidal regularity did not exceed two knots per hour.

The dates during which the currents followed the tides with the greatest regularity and the conditions of weather then prevailing, are given below. The directions of the wind are magnetic, as these correspond best with the direction of the strait itself. The magnetic variation is 35° W.

Monday, July 9th, to Friday, July 13th—Wind moderate; from the west or variable in direction. During the four days there were 60 hours westerly wind, averaging 9 miles per hour.

Thursday, July 26th to Saturday, July 28th—During two previous days (July 24th to 26th) there were 36 hours of westerly winds averaging 15 miles an hour; and 12 hours of easterly and variable winds averaging 14 miles per hour. From July 26th to 29th, winds from N.W. to S.W. for 54 hours, averaging 15 miles per hour.

Monday, September 17th to Friday, September 21st—Including the two days previous, or in all from September 15th to 21st there were 72 hours of westerly winds, averaging 15 miles per hour; and 72 hours of easterly winds, averaging 8 miles per hour.

The following summary shows the velocity of the current in the two directions, which in these periods is nearly equal; and a comparison is also given to show the relation between the times of high and low water at Forteau Bay, and the turn of the current in the strait, as observed at three points on the section line above mentioned.

Velocity of the Current.—The velocities given below were obtained by means of the most improved forms of current meters; and were all measured at the standard depth of 18 feet, which was well below the keel of the steamer.

July 9th to 11th; as observed one mile off Green Island, and

July 12th and 13th; as observed at the centre of the strait:—

Current from the east, maximum: 1.16 to 1.98 knots per hour.

Current from the west, maximum: 1.30 knots per hour.

July 26th to 28th; as observed at the centre of the strait:—

Current from the east, maximum: 1.80 to 1.98 knots per hour.

Current from the west, maximum: 1.08 to 1.26 knots per hour.

September 17th to 21st; as observed three miles off the north shore:—

Current from the east, maximum: 1.02 to 2.04 knots per hour.

Current from the west, maximum: 0.92 to 1.81 knots per hour.

The inequalities of the current in the last instance correspond with the diurnal inequality in the tides themselves.

Comparison of the Current with the Tide.—This comparison was made to obtain a relation between the direction of the current in the strait and the time of high and low water as observed at Forteau Bay.

During the periods of greatest regularity, as given above, the current ran inward from the east during the rise of the tide, and would either stop at high water, or still continue to run inwards for some time afterwards. The greatest length of time after high water during which it was observed to run inwards was two hours and fifteen minutes. The current then turned and ran outward from the west during the fall of the tide, and would continue in that direction for a length of time after low water, which varied from forty minutes to two hours and fifty-five minutes.

These differences in the relation between the turn of the current and the time of high and low water are partly due to the irregularity in the tides themselves. On the average the current ran inward from the east for one hour and forty minutes after high water, and outward from the west for an equal period of time after low water. A similar result was also obtained from a direct comparison between the turn of the current and the time of the moon's transit.

A relation of this character is very important to obtain; as it shows most clearly the true tidal character of the current in the strait. When the tidal record itself, which is now being obtained from the tide gauge at Forteau Bay, becomes sufficient for the calculation of tide tables, such a relation will enable the direction of the current under normal conditions when undisturbed by the wind, to be given in advance as definitely as the times of high and low water themselves.

The actual direction of the current in much complicated by the disturbing influences of the wind and barometer, as will be seen from the following instances in which the current ran persistently from one direction or the other.

Persistent Current in one direction or the other.—The most marked example of a persistent current running out of the strait from the west occurred from Monday, July 16th, to Thursday, July 19th. During these three days the current (as observed three miles off the north shore) ran in from the east for only five hours, and out from the west for 19 hours each day. The maximum velocity of the current from the east was 1.38 knots per hour; and from the west 2.44 knots per hour. The long run from the west was stronger at the beginning and end of the time, with an interval of weaker flow between the two. The times of high water corresponded with this minimum in the current from the west, and with the maximum current from the east. This condition of the current may therefore be considered as consisting of two components; a steady flow from the west, together with the usual tidal current in the two directions. As the moon's declination was at its maximum at the time, the diurnal inequality would largely account for the difference between the actual current from the east at the one tide, and the minimum of the current from the west at the other.

The best example of a persistent current running in through the strait from the east occurred from Wednesday, September 5th, to Saturday, September 8th. All the indications concurred in showing that the current ran continuously in the one direction during these days; although the observations were much interrupted by bad weather. There were also about a dozen icebergs seen in the strait during this time; and their motion agreed with the regular observations in showing that the current ran continuously inward from the east. The current then varied from a minimum of 0.54 knots per hour to a maximum of 3.15 knots, in the one direction. The tides themselves were anomalous; as the low water for five successive tides scarcely fell below mean sea level, and the whole rise was less than two feet, or about half of the usual amount.

In stating the conditions of wind and barometer during these periods of predominant flow, it may be well to recall that a difference of barometric pressure should tend to produce flow from the higher towards the lower pressure, just as in the case of the wind.

At the time of the predominant flow from the westward (July 16th to 19th), the wind ranged from N. W. to S. W. For three days previously, from July 13th to

16th, the average for 72 hours was 16 miles per hour; and from July 16th to 18th, the average for 60 hours was 14 miles per hour from the same direction. This was succeeded by easterly winds and broken weather. Also, from the morning of the 14th the difference of barometric pressure gave a barometric gradient which was inwards at Cabot Strait and outwards at the Strait of Belle Isle. This continued till the evening of the 17th when the pressure equalized itself; and by the morning of 19th a low pressure area developed over the Gulf which gave inward gradients at both straits and thus reversed the conditions for Belle Isle. The effects of both wind and barometer are thus in general accord with the direction of the current from the westward. It will also be noted that the total mileage of westerly wind in the case of this predominant current, is nearly double of its greatest amount during the periods when the current ran in harmony with the tides.

During the continuous flow from the east (Sept. 5th to 8th) the conditions of wind and barometer were disturbed and complicated, as a storm centre was passing over the northern part of Newfoundland at the time. The low pressure area of this storm centre was over the gulf during the 5th and was nearest to the strait on the morning of the 6th, on its way eastward to the Atlantic. From the morning of the 5th till the evening of the 8th there were 60 hours of N. N. W. wind averaging 25 miles per hour, and rising at times to 45 miles. During the remainder of the time the winds were light and variable. The relation of wind and barometer to the current at this time is not clear; beyond the general fact of the occurrence of a severe disturbance at the time of this continuous current.

Under-currents.—The under-currents in the Strait of Belle Isle were carefully observed at a depth of 25 to 30 fathoms by instrumental methods, and also by obtaining the speed of icebergs which served as "deep floats" for comparison with the surface velocity. The under-current would have had much greater importance if the current through the strait had proved to be a continuous one, for which an actual gauging of volume was required.

During the times that the current ran in fair correspondence with the tides, when the conditions may be considered as normal, the under-current was usually stronger than the surface current when the flow was from the east, and it was always weaker than the surface current when the flow was from the west. From the best ratios obtained when the current ran steadily, and omitting observations near the turn of the tide, the following percentages have been obtained:—

Current from the east. Under-current 5 per cent stronger than the surface current.

Current from the west. Under-current 70 per cent of the velocity of the surface current.

During the period of predominant current from the westward (July 16th to 19th) the under-current ran with much greater regularity in the two directions than the surface current. This indicates that the surface current itself was of the nature of a "wind-drift," and that the time was not sufficiently prolonged for the wind to influence the current to the bottom.

During the period of persistent flow from the eastward (Sept. 5th. to 8th) the under-current was decidedly stronger than the surface current, amounting on the average to nearly 20 per cent more. This result was obtained chiefly from the motion of icebergs.

Temperatures.—The temperature of the water was taken to ascertain its relation to the direction of the current through the strait; as the water at the Atlantic end is colder than the water at the western end towards the Gulf of St. Lawrence. It was therefore to be expected that the current running in from the east would be the colder of the two; and the temperature of the water might thus furnish an indication to vessels of the probable direction of the current.

The numerous observations taken are summarized and tabulated in the Annual Report of the Department of Marine and Fisheries for 1894, Appendix No. 3; page 100-102. They show that there is little appreciable difference in the temperature of the currents in the two directions so long as the current maintains its tidal character; but the difference is naturally more marked during the periods of predomina-

ant flow in one direction, already mentioned. It might perhaps be possible to ascertain from extended observations the amount of the difference to be expected under such conditions, above or below the normal temperature for the season. But at best, the temperature could only be taken to indicate the predominant direction of the current during the few days previous, and could not be relied upon to show its actual direction at the time.

The temperature of the water has a more important relation to the presence of ice in the strait. When the predominant direction of the current is inward from the east for a few successive tides, it will undoubtedly carry icebergs into the strait if there are any at its outer end at the time. The current from the east is thus not only cold in itself, but also brings in ice with it which further chills the water in the strait. The cold water, the current from the east, and the presence of icebergs within the strait, are thus concomitants of each other.

It is not to be inferred, however, that warm water in the strait is an indication that ice will not be met with; because the water in the strait itself may be relatively warm, notwithstanding that icebergs are numerous at its mouth around Belle Isle, and possibly as far in as the vicinity of Cape Norman. It is possible for this ice to be moving southward with the general Arctic current on both sides of Belle Isle, past the mouth of the strait, without affecting either the direction of the current or the temperature of the strait to any great distance inwards.

The following statement with regard to the current in the strait of Belle Isle at other seasons of the year, is based on information furnished by Mr. T. M. Wyatt, who has been lightkeeper at Amour Point for 15 years, and by Mr. Charles Davis, a resident of Forteau Bay. In the spring of the year, the prevailing winds are easterly, and the current also runs in continuously from the east, and only slacks with the tide without turning. The duration of this easterly current varies from year to year, but usually continues for one or two months in the interval between the beginning of April and the end of June. A strong west or north-west wind however, will make the current run out from the west. In the summer, the currents are less strong and not so persistent, and are more under the influence of the tides. In the autumn the winds are often easterly in the latter part of September and October; but perhaps more often westerly; and in either case the current is influenced by their direction. Later in the autumn north-west winds occur with colder weather. These winds continue to be prevalent during the winter months, and give the current an outward direction from the west.

This statement must be qualified by the usual uncertainties attributable to the weather; and it is also to be noted that any continuous currents are more persistent on the north shore where these observations were made. The residents on the south shore would convey the impression that the currents are much more regular in their tidal character; but their statements appear to be based upon the currents in the shallow water inshore, which may be different from those in the open strait.

SUMMARY FOR THE STRAIT OF BELLE ISLE.

In the following summary, the general characteristics of the current in the Strait of Belle Isle are given as correctly as they can be deduced from its behaviour during the time the observations were made. The velocities given, were measured at the standard depth of 18 feet.

1. The current is fundamentally tidal in its nature; and under normal conditions, it runs east and west with velocities which are nearly equal. It attains at times a velocity of two knots per hour in each direction.

2. The conditions are normal in moderate weather, and during the prevalence of moderate westerly winds.

3. During heavy winds, especially when easterly or westerly in direction, the current which runs with the wind becomes stronger than the current against it; and eventually, the current may come to be continuous in the same direction as the wind.

4. The greatest velocities of the current which were observed during heavy winds (in the months of July and September) were as follows:—From the east, 3·15 knots, and from the west 2·50 knots per hour.

5. The presence of ice in the strait, and the temperature of the water, have also a relation to the predominant direction of the current; but they do not afford a reliable indication of its actual direction at the time.

6. Under normal conditions, and when both surface current and under-current are taken into account, the difference on the average is in favour of a greater inward flow from the east.

7. The actual flow throughout the year, when the influence of the wind is included, appears also on the whole to be greater in the inward direction from the east, than outward from the west.

Current in the eastern end of the Gulf, immediately west of the Strait of Belle Isle, between Rich Point and the Esquimaux Islands.

From observations at three stations in this region, occupied between July 31st and August 3rd immediately after prolonged westerly winds, the current was found to be from the west (magnetic) at the centre and on both sides. The velocity amounted to 0·79 knots per hour at the centre, and 1·19 to 1·37 knots at the sides.

This in the circumstances is likely to be as great a velocity from the west as ever occurs, owing to the wind conditions for the week preceding this direction of the current. From July 24th to 31st there were in all 124 hours of westerly wind, averaging 20 miles per hour, and only 48 hours of easterly wind, averaging 19 miles per hour; or in all 2,530 miles of westerly wind, and 890 miles of easterly wind. The westerly winds also continued during August 1st and 2nd. The layer of water in motion from the west had a thickness of only 5 to 10 fathoms; which tends also to show that its movement was due to the previous direction of the wind.

From the above characteristics of the current in the Strait of Belle Isle, it is clearly possible for a vessel to over-run its reckoning in either direction through the strait. Also, vessels entering through the strait should not assume that the current is necessarily in their favour in making the run westward to round the eastern end of Anticosti; as it is possible that the set in the strait itself and also in the eastern end of the gulf, may be against them.

THE BELLE ISLE CURRENT IN RELATION TO THE GULF IN GENERAL.

On account of the tidal character of the current in the Strait of Belle Isle, it is clear that no great volume of water can enter the Gulf of St. Lawrence from that quarter. During the summer season, the current flows through the strait in both directions with velocities which are nearly equal; and there is only a difference in favour of inward flow from the east, which on the whole does not probably amount to more than a moderate percentage. There is reason to believe that in the early spring the preponderance of inward flow from the east may be proportionally greater than at other seasons. There is some evidence to show that the incoming water may then penetrate the gulf as far as Bonne Bay on the west coast of Newfoundland. But no reasons have been found for supposing that this water passes completely round the west coast of Newfoundland and finds its way out into the Atlantic through Cabot Strait, between Cape North and Cape Ray, in accordance with the theory which has been more or less accepted up to the present time. All the indications are against this theory; and the results of last season's work were already sufficiently conclusive to enable the theory to be considered as disproved. This conclusion is further corroborated by the investigations of the present season; which show that if there is any general current across the extent of the gulf, it must lie in an entirely different direction.

It may be allowable therefore to sum up briefly the reasons for this conclusion, from all the evidence yet obtained, during the two seasons.

The water in the Strait of Belle Isle is exceedingly clear. It is also very cold, and when flowing in the inward direction, its temperature as late as September is below 45° for the average of its depth from surface to bottom. Its density is as

high as that of any water found within the gulf being on an average 1.0244 at the surface.

The water in Cabot Strait is quite different from this in its character. The greater part of the width of that strait is occupied by water which has the usual milky-green colour of ordinary seawater. The out-flowing current in Cabot Strait, is on the side next to Cape North, or the further side from Belle Isle. This out-flowing water has also a distinctly brown tinge; its surface temperature ranges from 55° to 65°; and its average density to a depth of ten fathoms from the surface is 1.0230; and as far down as a depth of nearly twenty fathoms it is still both warmer and fresher than the Belle Isle water. If therefore the Belle Isle water has any influence on this current it can only be of a very indirect character. The greater speed which it is reported to have in the spring of the year, may be due in some measure to the incoming water at Belle Isle, if at that season its volume is considerable; for even if the water itself does not reach Cabot Strait, it may still act by displacement, as the total volume of the Gulf must remain nearly the same. Even this measure of influence cannot, however, be definitely asserted.

There is not only this difference in the character of the water in these two straits, but also a want of connection between them. The few observations obtained along the west coast of Newfoundland show that there is a slight current from the S.W., or in the contrary direction to that which the theory supposes. It is also stated by Lieut. Betty, navigating lieutenant of H.M.S. "Pelican" who has spent more than one season cruising along the west coast of Newfoundland, that the current there, between Cape Gregory and Rich Point, runs almost constantly from the S.W., and is only intercepted by the ebb and flood tides running in and out of the larger bays on the coast.

It might still be supposed however, that any water entering through the Strait of Belle Isle would be most likely to pass out at Cabot Strait as a cold under-current along the bottom. The total depth of Cabot Strait is 250 fathoms; the coldest water forms a layer between the depths of 30 and 50 fathoms, and below this the water is again warmer but with a higher density, which ranges from 1.0254 to 1.0260. As this cold layer occurs in other parts of the gulf area also, it cannot be taken as an indication of any special direction; and the characteristics of the deep water from 100 fathoms downwards, show how different it is from the Belle Isle water. The indications so far as obtained, also show that the deep water from 100 fathoms downwards is entirely quiescent.

There is therefore no confirmation to be found for the theory that a constant current enters the Gulf by the Strait of Belle Isle and leaves again by Cabot Strait; but on the contrary, all the evidence so far met with, is directly against it.

GENERAL EXAMINATION OF THE SOUTH-WESTERN SIDE OF THE GULF.

For the survey of the currents this season, the ss. "Lansdowne" was again made available for three months, from June 26th until September 27th. During this time it was necessary to call twice for coal, and also to spend several days in obtaining fresh water. In the month of August the weather was unusually broken and stormy, which also occasioned some loss of time. The surveying party consisted of myself and Mr. H. M. MacKay as assistant; the night observations were taken by Mr. G. E. Hardie during July and August, and Mr. R. E. Tyrwhitt in September. Meteorological observations were also taken by Mr. MacKay throughout the season. Captain G. J. W. Bissett commanding the ss. "Lansdowne," and the other officers, also gave their co-operation in facilitating the work.

There was considerable inconvenience for want of suitable anchorage appliances as provision had to be made for anchoring in all depths up to 250 fathoms, and on account of the low state of the funds available, it was towards the end of the season before appliances of a satisfactory character could be obtained.

In the investigations of last season to ascertain whether any general current could be traced across the gulf from the Strait of Belle Isle, the examination of Cabot Strait furnished an indication which pointed in an entirely different direction. The

out-flowing water around Cape North was found to be appreciably fresher or lower in density than the water at the central part of that strait and towards the Newfoundland side. The value of this indication was remarked in last year's report; as it pointed to a possible connection with the constant current which was shown on the charts as flowing eastward along the Gaspé coast at the entrance to the St. Lawrence, and which might also be presumed to have a low density. These currents although 200 miles apart both flow towards the south-east, or in an outward direction in relation to the River and Gulf of St. Lawrence; and there was good reason to believe that they were both of a constant character.

It was accordingly proposed this season to examine into the nature of the current in the Gaspé region; and also to ascertain whether any general set or drift could be traced across the width of the gulf to connect this with the out-flowing water at Cape North.

The entrance to the St. Lawrence between the Gaspé coast and Anticosti Island lies on the line of a deep channel which connects them with the ocean. This channel runs in from the Atlantic between the Grand Banks on the east and Banquereau and Misaine Bank on the west, with a width of some 40 miles, and a continuous depth of nearly 250 fathoms. After passing through Cabot Strait, it maintains its width and depth entirely across the gulf; passing north of the Magdalen Islands and between the Gaspé coast and Anticosti. It then penetrates the Lower St. Lawrence nearly to the mouth of the Saguenay, where the depth has only diminished to 150 fathoms at a distance of 420 miles from Cabot Strait. A branch of this deep channel also extends from the Magdalen Islands for a certain distance towards the Strait of Belle Isle.

At the beginning of this season, the region at the mouth of the St. Lawrence between the Gaspé coast and Labrador and around the west end of Anticosti, was examined to ascertain what characteristics of the water could be relied upon for the purpose of tracing its movements with the best hope of success. Although the colour of the water had been found to be appreciably different in different parts of the gulf, this is not an indication of a very definite character, though it may sometimes be helpful. The two characteristics chiefly relied upon in tracing currents are the temperature and the density of the water.

In examining the temperatures in this region and comparing them with the numerous observations which had now been obtained in other parts of the gulf area, it soon became evident that for the purpose in view this could not be relied upon as any definite indication of the direction of the movement of the water. The surface temperature in the summer season usually ranges from about 50° to 65°, and in proceeding downwards this temperature gradually falls, until at a depth of 40 or 50 fathoms it is only 30° to 34°, or practically at the freezing point. Where the greater depths are met with, the water below this again is found to be appreciably warmer. There are considerable areas, however, in which the depth is less than 50 fathoms, and where the conditions are accordingly restricted.

It appears, therefore, that in general, the temperature of the surface water merely rises with the progress of the season; and it is also natural that the water should become warmer to a greater depth as the season advances. Even this has its limitations, however; as at a depth of 50 fathoms no greater rise in temperature has yet been found than from 32° to 34°, between the month of June and the end of September.

In the Gaspé region, as well as in Cabot Strait, the coldest water forms a layer between the depths of 30 and 50 fathoms. Also in the vicinity of the Strait of Belle Isle the same low temperatures are found at these depths; although there the temperature towards the surface is relatively lower, as a rule, than in the other regions. As these conditions, therefore, occur at all three angles of the gulf, and have also been found at a few intermediate points where observations have been obtained, it appears not at all impossible that this cold layer may extend very generally over the gulf area; and it cannot, therefore, be taken as an indication of direction of movement of the water.

Below this cold layer, in the deeper water of the channel above referred to, the temperature from 100 to 200 fathoms is found to range very constantly from 38° to 41° . This result was obtained last season in Cabot Strait; and the constancy of the actual temperatures obtained at different dates at these depths, as well as the precautions taken to insure accuracy in the observations are given in detail in last year's report. During the present season, the same temperatures have also been found at these depths between the Gaspé coast and Anticosti, which is 220 miles further in than Cabot Strait, along the deep channel leading from the Atlantic. This deep water, from such indications as have been obtained, appears also to be entirely quiescent, and to have therefore little direct relation to the currents in the gulf, in so far at least as they affect navigation.

From a limited number of determinations made in the eastern portion of Cabot Strait, and also along the west coast of Newfoundland and in the Strait of Belle Isle, the density of the surface water in that region appears usually to range from 1.0233 to 1.0245. This is much the same as in the open Atlantic; as the density of the surface water off the coast of Nova Scotia was found to range from 1.0235 to 1.0245. The deep water however, as found from samples taken at depths of 100 and 150 fathoms, both in the vicinity of Gaspé and in Cabot Strait, ranges in density from 1.0254 to 1.0261. Again, on the western side of Cabot Strait, the outflowing water which occupies a width of about 10 miles on the side next Cape North, has a density at the surface of 1.0220 to 1.0227; and in the western portion of the gulf, off the New Brunswick coast, areas were found in which the density was even lower than 1.0220. These densities are in all cases the true specific gravity of the water, reduced to 60° Fahrenheit, and determined by hydrometers specially designed for the purpose.

The density of the deep water, from 100 fathoms downwards, is very interesting in affording an explanation for the otherwise anomalous fact that the colder water at 50 fathoms is found to float upon it. It also corresponds with the density at similar depths, off the coast of Nova Scotia, as reported by the "Challenger" expedition. It would, no doubt, be very interesting to trace the connection of this deep water with the ocean, as the channel in which it lies runs out into the Atlantic basin with uninterrupted depth. But this investigation does not promise any result of immediate practical importance.

On the other hand, the density of the water towards the surface, which is a measure of the degree of saltness of the water, or the amount of fresh water with which it is mixed, is of special value in the regions under consideration. The distinct difference in density as above described, affords an indication which is much more definite than difference of temperature, for the purpose of tracing any general set or current across this portion of the gulf.

The temperature and density of the water may also serve indirectly to throw light upon the distribution of fish; as it has been found on other coasts that their movements depend largely upon these elements. The depth at which the cold layer occurs may have a bearing in this connection, as the fish have usually a preference for cold water. It may also be noted that at the greater depths of 150 to 250 fathoms the bottom as shown by samples brought up by the anchor, is soft mud from brownish-blue to slate colour; and the marine life there, judging by such specimens as came up, consists chiefly of sea-pens and other stalked creatures, which root themselves in the muddy bottom. There does not therefore appear to be at these depths much food of an inviting character for fish. An examination of such conditions might well prove useful, in view of the large annual value of the Canadian fisheries.

As the indications above mentioned were sufficient as a preliminary, a careful examination was made of the Gaspé current itself. This occupied the month of July; and the region selected for the purpose was that lying between the Gaspé coast and the Island of Anticosti. This region is limited by the shore lines extending from Fame Point to Cape Rosier on the Gaspé side, and from West Point to South-west Point on the Anticosti side. These shore lines are parallel to each other at a distance of 40 miles apart; and the currents were therefore likely to be more

regular and less disturbed than in either of the more open areas lying immediately to the north-west and south-east. The currents in the Mingan channel north of Anticosti were also examined, and information was thus obtained regarding both passages by which the St. Lawrence River communicates with the gulf.

As had been anticipated, the water flowing south-eastward along the Gaspé coast proved to be distinctly lower in density or fresher than ordinary sea water, especially towards the surface. The movements of the current and its other characteristics were first ascertained; and the endeavour was then made to trace the water by its lower density across the width of the gulf in the direction of Cape North. The density of the water was taken along a series of sections, and at various depths between the surface and 50 fathoms; or as far down as the depth at which the coldest water had been found. The density of the water at 10 and 20 fathoms was chiefly relied upon for comparison; because if a greater depth were selected, there are considerable areas where interruption would occur from the shallower banks; and on the other hand the disturbing influence of variable winds should be less marked at these depths than at the surface.

These section lines were run between Gaspé, Anticosti and the Orphan Bank, in the vicinity of the Magdalen Islands, and on lines extending north-eastward from Cape Breton. It was necessary to make the determinations of the density at the time, as it was a question of tracing the water, and ascertaining the limits of areas of less density, without any previous clue as to where these limits would probably be found. Also in returning towards Gaspé, additional section lines were run from the west coast of Cape Breton to the Magdalen Islands and Prince Edward Island, to ascertain more definitely from what direction the water comes which flows past Cape North to the south-eastward. Several of the section lines in the vicinity of the Magdalen Islands and Anticosti, were also run a second time to ascertain to what extent the results already found might be liable to disturbance, or whether they might be considered as permanent.

This work was chiefly done in the month of August; and the remainder of the time available was spent in a further examination of the currents in the Gaspé region, for comparison with their characteristics as obtained in July.

The results of the work cannot be satisfactorily given at present, immediately at the close of the working season, until there is time to prepare charts and sections to show the distribution of water of the various densities met with, and the general circulation which may be inferred from it. The relation of the currents to the wind must also be worked out; as the disturbing influence of the wind occasions considerable complication in the movement of the currents.

In the meantime it may be stated in general terms that the density of the water on the south-western side of the gulf was found to be distinctly lower than further out towards the central region. This area of water of less density is approximately limited by a line from South-west Point, Anticosti, to St. Paul Island, C.B., and it is in the direction of this line that any slow movement or set of a general character across the gulf area must take place.

THE GASPÉ CURRENT.

It may also be of advantage to give at once some notes regarding the current along the Gaspé coast, and especially to mention some exceptional directions of the current, as to which, up to the present time, there has been no information available.

On the Admiralty chart entitled "Entrance to the River St. Lawrence," No. 1621, a current is shown to run constantly along the Gaspé coast from a north-westerly direction at about three miles off shore. In the Sailing Directions it is stated that this may be felt as far out as nine to twelve miles from land. Another line of constant current is also shown as lying along a line from the vicinity of Cape Magdalen, to South-west Point, which thus traverses the middle of the passage between the Gaspé coast and Anticosti. It is this central line of current which is alone represented on the general chart of the Gulf of St. Lawrence, No. 2516. It

is explained, however, in the Sailing Directions that the current does not follow both these lines at the same time; and the change from the one direction to the other is attributed to the influence of south-west winds.

The first of these lines was found to represent fairly the usual direction of the current along the Gaspé coast. The other line is properly to be regarded as an alternate direction which the current may take; unless indeed there may be times at which the current becomes very wide-spread and weak. When the current is found in the position shown by the line along the middle of the passage, it may even be accompanied by a reversal of the direction of the current along the Gaspé coast. The method of density sections above described was found a very effective one by which to ascertain the location of the current over a wide area at any given time, when compared with the regular observations of the speed and direction of the current as obtained from the steamer while anchored at different stations.

These changes in the position of the current may prove to be due to its displacement by the wind. There are also fluctuations in its velocity which are probably to be attributed to the influence of the tides. It is to be hoped that some light may be thrown upon these relative effects and the conditions under which they occur when the observations which have been obtained are worked out.

The following notes regarding the Gaspé current and its exceptional directions, may be given at present without explanation, to make known the possibility that such directions of the current may occur. The velocities were measured while the steamer was at anchor at the different stations, by means of current meters at the standard depth of 18 feet. The directions given are magnetic; the magnetic variation being 28° W.

The greatest velocity of the current on the Gaspé coast while it ran parallel to the shore from the usual north-westerly direction, was observed at a station 5 miles off Fame Point on July 5th. The velocity then was 2.81 knots per hour.

The most noteworthy instance of a reversal of this current occurred from July 27th to 31st. There is reason to believe that during these days the current in the offing of Fame Point ran continuously from the south-east, or contrary to its usual direction. From observations at a station $3\frac{1}{2}$ miles off Fame Point, the greatest velocity from this south-easterly direction occurred on July 31st, when it amounted to 1.43 knots per hour.

It is possible, also, for the current to run directly on or off shore for a short time, as the following instances show:—

At a station 13 miles N.E. by E. from Cape Rosier, on July 11th, the current veered from N. to E.N.E. and back to N. It ran from the E.N.E. or directly towards the shore, for two hours, with a velocity of a little over one knot. During the following night it again veered in the same way, and ran from the E.N.E. for two hours, with a velocity of nearly one knot per hour.

At a station $4\frac{1}{2}$ miles E.N.E. from Griffin Cove, on September 17th, the current ran for $4\frac{1}{2}$ hours from directions between E.S.E. and E. by N., all of which set on shore. The velocity in these directions varied between one knot, and one and one-third knots per hour.

At two stations, 4 miles off Fame Point, and 5 miles off Griffin Cove respectively, the current on two occasions, while veering in direction, ran for about an hour directly off shore, with a velocity of over half a knot.

Also on the south coast of Anticosti, on July 22nd, at a station $5\frac{1}{2}$ miles from the shore, and 4 miles east of Ellis Bay, the current ran for 5 hours from directions between W.S.W. and W. by N. or almost directly on shore, with a velocity which averaged over three-quarters of a knot.

At a station $6\frac{1}{2}$ miles off the south shore of Anticosti, and 15 miles west of South-west Point, the current during the night of July 24th ran for three hours from directions between W. and S.W., or directly on shore, with a velocity of a little over half a knot. A few hours later the direction at this station was off shore during two hours, with a somewhat lower velocity.

The co-operation of the leading steamship companies was requested in the work of this season, in noting from the logs of their vessels the currents met with in the gulf, for comparison with the results obtained in the survey itself. Blanks were prepared in which the area of the gulf was divided into regions to accord with the various steamship routes, and on which it was desired that the direction of the current should be noted. These were supplied to the following companies:—

Messrs. H. & A. Allan, of the Allan Line; D. Torrance & Co. of the Dominion Line; D. W. Campbell, of the Beaver Line; Kingman, Brown & Co. of the Black Diamond Line; J. G. Brock, of the Quebec SS. Co.; and also to the Gaspé and Baies des Chaleurs Line. The thanks of this department are due to these companies, and to the captains of their steamships for the trouble they have taken in the matter; and the notes made will undoubtedly prove of value.

The examination of the two entrances to the Gulf of St. Lawrence made last season to ascertain its relation to the Atlantic, and the more extensive investigations of the circulation in the interior of the gulf this year, have not only afforded important information with regard to the currents in the regions examined, but will also serve as a general basis from which to carry on with better advantage, the more thorough study of the nature of the currents in other regions of the gulf.

As the currents so far met with in the gulf area have usually had a strength of only one or two knots per hour, and have seldom attained three knots, they are very liable to disturbance from the wind. They seem also to be more or less influenced by the tides; which in their turn are affected by the barometer. To obtain complete information therefore, regarding these currents under all variety of conditions that can occur, will require much patient investigation. It is therefore, all the more necessary to direct special attention to the regions traversed by the leading steamship routes, in order that the results obtained may be of direct practical value.

I have, sir, the honour to remain,

Your obedient servant,

W. BELL DAWSON,

In charge of Tidal Survey.

APPENDIX No. 4.

METEOROLOGICAL SERVICE.

WILLIAM SMITH, Esq.,
Deputy Minister, Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit herewith the twenty-fourth report of the Meteorological Service, this report being for the period July 1st, 1894, to June 30th, 1895, with Appendices A, B and C, inspectors' reports, and reports on Quebec and St. John and Montreal Observatories.

During the year the following stations were added to the number reporting:—

Ontario.

Class I.—
Martin's Falls.....James G. Christie.
Class II.—
St. Ann's.....George Harcourt.
Stouffville.....Thomas Smith.
Mill Brook.....A. Leach.
Class III.—
St. Thomas.....E. C. Tettersington.

Quebec.

Class II.—
Roberval.....B. A. Scott.
Grosse Isle.....Medical Superintendent.

Nova Scotia.

Class II.—
New Glasgow.....W. H. Magee, B.A.

Prince Edward Island.

Class III.—
Georgetown.....J. H. Byrne.

Newfoundland.

Class II.—
Battle Harbour.....J. H. Bennet, M. D.

North-west Territories.

Class I.—
Norway House.....George Chute,
Class II.—
Duck Lake.....Inspector D. A. E. Strickland, C. E.
Moose Jaw.....J. H. Fingland, C. E.
Cannington, Manor.....Ernest Humphrey.
Class III.—
Pense.....B. Spring-Rice.

British Columbia.

Class I.—

Kuper Island.....Rev. R. J. Roberts.

Class II.—

KasloJ. Wm. Cockle.

Chilliwack.....John A. Logan.

Bella Coola.....Miss G. Sangstaid.

KamloopsE. T. W. Pearse.

Class III.

Goldstream LakeWm. W. Ralph.

Penticton..... R. Paton.

Banff, N. W. T., Rivers Inlet, B. C., and Haileybury, Ont., have been raised from 2nd to 1st class stations. Kuper Island, B. C., has also been supplied with a sunshine recording instrument and since February last the record has been properly forwarded. Instruments have also been supplied to a station at midway in the Yale district, but so far no report has been received.

Wanstead, in Essex County, Ontario, has resumed observing which had been suspended for some time owing to absence of observer.

STATIONS CLOSED.

Of the stations closed, Courtright, Ont., ceased to observe from personal causes; Norwood, Ont., owing to removal consequent upon the death of the Rev. Mr. Carmichael. Fort Ellice, Man., has also ceased, the observer finding the duties too onerous.

Observers in Manitoba and Ontario under their respective Departments of Agriculture continue to persevere in their work and since the issue of the monthly weather map show increased zeal by voluntarily taking more extended work and promptly supplying the necessary information at the beginning of the month.

The most marked increase has taken place in the province of British Columbia the peculiar features of its topography requiring stations to be placed much closer than in the other provinces, this being fully realized by the Minister of Agriculture, and his deputy (Mr. J. R. Anderson) the office is especially indebted for their zealous co-operation in the selection of stations and securing competent observers.

The agents of the Canadian Pacific Railway continue to record the observations on certain parts of the line, but from the nature of their duties and previous training they, with some exceptions, would require to be not only inspected from three to four times each year, but time devoted to their instruction in observing, the frequent changes occurring in the railway staff often removing a fair observer and replacing him by one with no previous knowledge of instruments or observing.

I would suggest that a small gratuity might be well bestowed upon the general class of voluntary observers; many of them have been observing years with no recognition beyond the card acknowledging the receipt of their work.

CENTRAL OFFICE.

Early last year Mr. Carpmael, who since 1872 served until 1879 as Deputy Superintendent and subsequently as Director of the Meteorological Service, was obliged through failing health to relinquish his duties, and in the month of May went to England in the hope that the change would be beneficial. I was left in charge of both the Magnetic Observatory and the Meteorological Service during his absence. In October, Mr. Carpmael died in England and I continued to discharge the duties of director. On December 28th, I was appointed director, but no other appointment was made to the staff of probability officers and inspectors, of which I had been a member, and the work of the service is now carried on with a smaller number of officers than formerly. In January, a boy, Mr. W. R. Kingsford, was appointed to assist in the correspondence office in place of C. E. Tweedie, who has since been assisting in the statistical work of the service. The work of the office has materially increased during the past year, this is owing to the publication of a monthly map, the supplying of meteorological data to the Director of the Tidal

Survey and to a great effort being made to bring the Annual Report and Monthly Weather Review nearer to date, which result I have reason to think will be accomplished in the not far distant future.

STORM SIGNALS.

There were not a great many heavy gales during the past year, although a good many moderate storms occurred, especially in October and November. Then again there was an entire absence of August West India hurricanes, whereas in the preceding year no less than four of these great storms had made their presence felt in Canada.

The important storms of the year were with few, if any, exceptions well warned; from twelve to twenty-four hours notice being given of their approach. The most severe gale of the year was experienced along the Nova Scotia coast, and over the Maritime Provinces generally, during the night of the 4th and on the 5th of February. This storm was warned at 11 a.m. on the 4th, which gave about twelve hours' notice of its approach. Liscomb reports it as the heaviest gale of the season with tremendous seas. At Port Morien the breakwater was literally cut in two by the huge seas which are reported to have been mountains high; Port Morien further says, "no such storm known since the memorable August hurricane of 1873." Also at Ingonish and many other places it caused immense damage. The other noticeable storms were: October 14th, heavy gale over gulf and Maritime Provinces, twenty-four hours' notice given of its approach; November 26th and 27th, heavy gale on the lakes, twelve hours' notice of its approach given, and during the night of the 27th and on the 28th of December, a heavy gale swept the Maritime Provinces, twenty-four hours' notice being given of its approach.

A storm signal mast has been erected at Georgetown, P.E.I., and the signals placed in charge of Mr. J. H. Byrne, jr.

New storm signal masts have been erected at Yarmouth, N.S., and North Sydney, N.S., in place of the old masts which were rotten. The mast at Souris, P. E.I., has been removed from its old position down the shore to the high land immediately in front of the landing stage; and at Amherstburg a mast has been erected on the new waterworks wharf in place of on the Mullen-Garfield Coal Company's wharf.

TABLE I.

THE following table shows the total number of warnings issued and the percentage verified:—

Year.	No. issued.	No. verified.	Percentage Verified.
1877.....	743	510	68.6
1878.....	860	673	78.3
1879.....	712	591	83.0
1880.....	889	736	82.8
1881.....	854	727	85.1
1882.....	841	658	78.2
1883.....	1,085	858	79.1
1884.....	798	663	83.2
1885.....	830	741	89.3
1886.....	906	799	88.2
1887.....	1,093	972	88.9
1888.....	897	758	84.5
1889.....	1,126	926	81.3
1890.....	1,199	987	82.3
1891.....	1,017	826	81.2
1892.....	1,161	888	80.7
1893.....	1,317	1,118	84.9
1894.....	1,333	1,149	86.2
1895—six months, 1st January to 30th June.....	298	259	86.9

WEATHER FORECASTS.

Weather forecasts have been issued regularly throughout the period comprised in this report, they have been published daily by most of the leading newspapers of the Dominion, besides being posted at about 1,500 telegraph offices in Manitoba, Ontario, Quebec, and the Maritime Provinces.

Since September last, in addition to the ordinary forecasts, a bulletin has been telegraphed each morning, at 10.15 a.m., to the harbour masters or other suitable persons at the various principal ports on the lakes and in the Maritime Provinces. Usually the bulletin contains a forecast of the force and direction of the wind for the next 36 hours, but at times, when thought advisable, a general statement as to the probable movement of storms is given, and I have much pleasure in reporting that these bulletins have proved a very great success; they are now posted each day at twenty-eight ports, viz.:—Port Arthur, Sault Ste. Marie, Collingwood, Owen Sound, Sarnia, Amherstburg, Hamilton, Port Colborne, Port Dalhousie, Toronto, Kingston, St. John, Halifax, Guysborough, Liscomb, Port Morien, Sydney, Digby, Shelburne, Liverpool, Bridgewater, Lunenburg, Parrsborough, Charlottetown, Tignish, Alberton, Summerside and Georgetown. On January 4th, I sent a circular to the harbour masters at these points, asking them to report as to the time of posting of the bulletins, &c., and the following are extracts from some of the replies received:—

Yarmouth, N.S.—"The weather bulletins are posted regularly in a conspicuous place on Water Street, where shipping men cannot fail to notice them, and they have already come to be looked for and consulted by them. We know of two vessels, only last week, that took warning from your report, and by so doing escaped a terrible gale which we notice did much damage all along the American shore. They were the schooners 'Roulette,' of Boston, and 'Ernest Norwood,' of Digby, both fishermen, and there is a three-master, called the 'J. W. Durvant,' been around this morning waiting for your report for to-morrow, before deciding to tow out or not. You have predicted our weather so correctly as to give confidence to the seafaring public, and having missed in not more than two or three cases in as many months, and we have no doubt the forecasts have been and will be, if continued, the means of saving life and property." (Signed) EBEN SCOTT, harbour master.

Lunenburg, N.S.—"I am sure it is a great benefit to those going to sea. For instance the large schooner 'Narcissus,' bound for the West Indies, was stopped for two or three days on account of coming storm. I have also asked quite a number of captains and owners and they say it is quite satisfactory to all concerned in vessels." (Signed) W. H. BEGG, harbour master.

Georgetown, P.E.I.—"These reports are invaluable, but should be posted here earlier in the day. Between 2.00 o'clock and 5.00 o'clock is not satisfactory. consider them of great importance to mariners and fishing boats generally." (Signed) SAMUEL HEMPHILL, harbour master.

Pictou, N.S.—"I cannot give you a positive answer as to how many have been governed by the warnings, but I feel satisfied that a large portion of the coasting vessels have given it their attention and acted accordingly." (Signed) JOHN GUNN, harbour master.

North Sydney, N.S.—"In busy season I have seen captains come and read the bulletins and decide not to go to sea until more favourable weather. I think as soon as spring opens it will be advisable to continue the bulletin." (Signed) GEORGE B. MOFFAT, harbour master.

St. John, N.B.—"The bulletin is very much appreciated by mariners. I have heard many expressions of their usefulness." (Signed) D. L. HUTCHINSON, Director, St. John Observatory.

Liscomb, N.S.—"We know it will be of great benefit to fishermen here, as the predictions in every case since we have been receiving them have been very correct. Of course it is something new for this place, and at first people generally did not take much notice of the bulletins, but they have been so correct that people look for them now so as to know what the weather will be the next day. There are fishing

vessels in the harbour nearly every night, and I feel quite sure that the bulletins are much appreciated by the fishermen." (Signed) JAMES HEMLOW, jr.

Port Morien, N.S.—"I consider it of benefit to mariners and fishermen; they look for the report every day." (Signed) HERBERT McDONALD, harbour master.

Harbour masters at other ports also make most favourable comments.

The demand from persons in Toronto and at a distance for special forecasts continues, and in all cases predictions have been furnished at once to those asking for them.

Warnings of approaching storms, as heretofore, were issued to the railways, and have apparently been valued.

Train signals, as usual, were displayed during the summer on the morning trains in Ontario, Quebec and Maritime Provinces.

The percentage of verification of the forecasts for the year has been well up to that of the past few years.

The following table (No. 2) shows the predictions and the percentage of fulfilment in each district, in each month and in the whole period:—

NUMBER of Predictions and Percentage of fulfilment in each District

MONTH.	MANITOBA.					LOWER LAKE REGION.					UPPER ST. LAWRENCE.				
	Number of predictions.	Verified.				Number of predictions.	Verified.				Number of predictions.	Verified.			
		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.
1894.															
July.	81	70	8	3	91.4	110	94	13	3	91.4	105	87	11	7	88.1
August.	88	69	8	11	83.0	105	82	10	13	82.9	101	84	11	6	88.6
September.	92	72	12	8	84.8	115	89	17	9	84.8	97	78	12	7	86.6
October.	99	63	18	18	72.7	125	89	14	22	76.8	111	73	18	20	73.9
November.	107	76	14	17	77.6	131	102	20	9	85.5	120	94	18	8	85.8
December.	89	58	16	15	74.2	116	90	19	7	85.8	103	82	14	7	86.4
1895.															
January.	92	62	22	8	79.3	125	77	36	12	76.0	109	74	21	14	77.5
February.	80	67	7	6	88.1	103	80	13	10	84.0	94	71	16	7	84.0
March.	84	61	11	12	79.2	106	66	17	23	70.3	99	78	15	6	86.4
April.	84	66	12	6	85.7	97	77	14	6	86.6	99	88	6	5	91.9
May.	84	65	13	6	85.1	113	97	7	9	88.9	93	75	10	8	80.6
June.	81	50	20	11	74.1	106	84	13	9	85.4	92	71	13	8	84.2
Total.	1,061	779	161	121	81.3	1,352	1,027	193	132	83.2	1,223	955	165	103	84.5

in each Month, and in the Year, July, 1894, to June, 1895, inclusive.

LOWER ST. LAWRENCE.					GULF.					MARITIME.					TOTAL.				
Number of predictions.	Verified.				Number of predictions.	Verified.				Number of predictions.	Verified.				Number of predictions.	Verified.			
	Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.
95	77	12	6	87.4	90	70	13	7	85.0	97	73	13	11	82.0	578	471	70	37	87.5
96	78	12	5	88.4	98	80	8	10	85.7	102	90	8	4	92.2	589	483	57	40	86.8
96	72	8	15	80.0	97	72	16	9	82.5	97	70	14	13	79.4	593	453	79	61	83.1
109	75	16	18	76.1	115	77	20	18	75.7	116	89	18	9	84.5	675	466	104	105	76.7
118	96	14	8	86.4	119	99	12	8	81.5	119	93	18	8	85.7	714	560	96	58	85.0
104	83	9	12	84.1	97	68	12	17	76.3	110	75	13	22	74.1	619	450	83	80	80.4
99	69	15	15	77.3	91	67	11	13	79.7	109	76	24	9	80.7	625	425	129	71	78.3
91	75	10	6	87.9	95	77	13	5	87.9	109	90	12	7	88.1	572	466	71	41	86.6
97	71	14	12	80.4	96	78	10	8	86.5	104	68	21	15	75.5	586	422	88	76	79.5
98	78	15	5	87.2	96	86	9	1	94.3	110	94	11	5	90.5	584	489	67	28	89.5
92	64	15	13	77.7	87	70	7	10	84.4	98	73	17	8	83.2	567	444	69	54	84.4
88	58	15	15	74.4	91	66	19	6	83.0	105	80	17	8	84.3	563	409	97	57	81.3
1,181	896	155	130	82.3	1,172	910	150	112	83.5	1,276	971	186	119	83.3	7,265	5,538	1,010	717	83.3

GENERAL REMARKS.

The monthly map is printed with the view of keeping the agricultural and other interested portions of the community posted, as to the meteorological conditions prevailing, and the advance of the seasons in the various parts of the Dominion; with this object it is printed a few days after the close of each month, and contains notes on the leafing and flowering of trees and shrubs, the arrival of birds, state of crops, &c. Much interest is taken in this map by the public in general, and voluntary observers have been so stimulated to increased work, that we are now receiving such an accumulation of climatological and meteorological data as was never before obtainable, and will be most valuable should it ere long be deemed advisable to prepare a work on the climatology of the Dominion.

In order to facilitate the obtaining of information regarding the weather by mariners in the Maritime Provinces the Director of the St. John Observatory has since the spring been furnished with a very full and comprehensive daily bulletin containing the 9 a. m. reports from eight stations in the Maritime Provinces and New England, a general statement of the pressure and weather conditions over the continent, and a forecast for as long a period as it is thought advisable to make. At the foot of the printed bulletin form is a note to the effect that "Telegraphic messages of inquiry regarding the weather from ports where the morning bulletin is not posted addressed to 'Observatory St. John' will be answered without delay. Inquiry and answer cost but one rate, which must be paid by the inquirer." This insures all mariners being able to get the forecasts. It is due to add that Mr. Hutchinson has been most enthusiastic and energetic in increasing the usefulness of the service in the Maritime Provinces. Since May the same bulletin has been sent to Mr. Allison, our agent in Halifax, and has been displayed each day at some nine points in the city as well as being published in some of the afternoon newspapers.

In December last I visited Washington and New York, with the object of looking into the methods of working employed in the United States Weather Bureau, and if deemed advisable adopting such methods in the Canadian service. I was much struck with the admirable management, and with the earnest desire displayed by all to improve their service, and profited much by the inspection of their instruments and apparatus, but at the same time concluded that our methods of forecasting and of disseminating forecasts were equally as good as those in vogue in the United States.

I took with me a standard barometer, and made careful comparisons with the United States standard.

UNITED STATES WEATHER BUREAU.

The Chief of the United States Weather Bureau has continued to interchange reports with this office, and I desire to express my warm appreciation of the uniform courtesy that has characterized all communications from that office.

TIME SERVICE.

The method of performing this work, together with a table showing the discordance at the different observatories, will be found in the report on the magnetic observatory.

The report on Quebec Observatory forms Appendix B.

The report on St. John Observatory forms Appendix C.

The report on the McGill College Observatory forms Appendix D.

PUBLICATIONS.

Applications are frequently made by persons and institutions in different parts of the world for the publications of this office. Over 800 copies of the Monthly Weather Review are distributed immediately upon their being printed, and since January, 400 copies of a Weather Chart have been issued monthly.

LIBRARY.

The number of publications received during the year was 280, being for the most part annual reports, pamphlets and periodicals from the principal astronomical, meteorological and magnetical institutions of the world.

For the last six or seven years the library has been over-crowded, and the publications received have now to be tied in bundles and piled in out-of-the-way places, making it difficult to keep a catalogue, or to have books handy for reference. It will be necessary to provide more room and to make out a new catalogue of the whole library. Owing to the fact of there having been scarcely any binding done during the last nine years, there are at present many works of reference on hand to be bound.

INSPECTION OF STATIONS.

There were 67 stations inspected during the period covered by this report. Of these, 43 were inspected by Mr. Webber, 23 by Mr. Paye and 1 by Mr. Denison.

These reports form Appendix A, and give the state and condition of the various stations visited, and show the absolute necessity of regular and systematic inspection.

All of which is respectfully submitted,

R. F. STUPART,
Director.

APPENDIX A.

INSPECTORS' REPORTS.

INSPECTOR B. C. WEBBER.

New Westminster, B. C., 2nd July, 1894.—The instruments are at the Methodist College, situated in the highest part of the city, at present they are too much sheltered in a small back yard, but shortly, when alterations are made at the college, it is the intention to place them in an open space. Mr. Gamble, of Victoria, now has a fully equipped meteorological station at the mouth of the Fraser River, which will be a good substitute for New Westminster, should observations be discontinued at the latter place at any time.

Esquimalt, B. C., 3rd July, 1894.—The barometer was reading as heretofore, but it was very opaque, it was cleaned thoroughly. Spare Green barometer, 3164, was left at this station. All work is well done, and Mr. E. Baynes Reed loses no opportunity in trying to obtain reliable observers over British Columbia.

Nanaimo, B. C., July 5th, 1894.—Mr. Good did not feel disposed to continue observations gratuitously, so as the Rev. R. J. Roberts, of Kuper Island, had expressed his willingness to assume the duties, the instruments were removed from Nanaimo to Kuper Island.

Carmanah, B. C., 9th July, 1894.—This station is at the mouth of the Strait of Juan de Fuca, and directly opposite Tatoosh Island. The barometer is 130 feet above sea level, it was quite dirty and I had it well cleaned. Instruments are well exposed. The annual rainfall here is enormous.

London, Ont., 4th December, 1894.—The thermometers were reading correctly. I discovered that the barometer had been read several hundredths too low on the morning of my visit, and on the observer re-setting and reading the instrument, the reading was again quoted two-hundredths lower than it actually was. The rain-gauge was in a dilapidated condition, broken off at its base, and the inside receiver had two holes in the bottom.

Courtright, Ont., 6th December, 1894.—Mr. Sinclair was not disposed to do the work at this place without receiving remuneration, so brought the instruments back to the central office.

Port Stanley, Ont., 6th December, 1894.—Placed the new anemometer and vane in position and left the gauge working fairly well; all other instruments in good order.

Stratford, Ont., 7th December, 1894.—The barometer is getting a little dirty and will soon be the better of cleaning. Mr. Dick attends very faithfully to the work and is a thorough and conscientious observer.

Owen Sound, Ont., 11th March, 1895.—The thermometers were tested and proved to be correct, but as the old style thermometer box was in use, it was deemed advisable to substitute the regulation shed. Tenders were invited for the repainting of the storm signal pole as it was in need of it.

Bognor, Ont., 12th March, 1895.—The observing station is situated about sixteen miles south-east from Owen Sound. The observer although a man of seventy-seven years was very anxious to continue as an observer, and will gladly add the maximum and minimum thermometer readings to his observations. Maximum 79905 and minimum 79924 were left at this place.

Presque Isle, Ont., 13th March, 1895.—The old Green anemometer in use here for fourteen years had become worn out, so replaced it by one of the new pattern, made up a new three cell battery to replace the one broken to pieces by the frost, renewed portions of outside wires and put all in good order generally and left everything working well.

Quebec, Que., 3rd May, 1895.—The anemometer platform was much worn and shaky, it was therefore necessary to have it renewed. The binding collar of carriage of vane is defective and occasionally works loose, the anemometer is a good deal worn and the spindle has been already reversed. The time ball apparatus needed some repairs both to gear and building together with a new chain. All thermometers were re-scaled and the barometer is reading correctly.

Halifax, N. S., May 6th, and 21st, 1895.—Approved of proposed site for anemometer at Citadel and considered the building of an annex for anemograph necessary. Cleaned the barometer as it was quite dirty. On return visit removed wind gauge from observer's house to its new position at the Citadel and left it working well. The work at the Citadel has been well and thoroughly done, the anemograph is connected by a seven wire cable which is carried through an iron pipe and buried some distance in the ground. The new exposure for the gauge will, I should judge, give the true force of the wind at sea, and not in excess of it. A new drum and cone was much needed and furnished, the mast also required repainting, and the drum box had to be re-built.

Lunenburg, N. S., 7th May, 1895.—The harbour master here says the daily weather bulletin is much sought after by the fishermen. It is posted in two conspicuous places. About sixty vessels sail from this port, consequently it is rather a desirable point for a storm signal.

Liverpool, N. S., 8th May, 1895.—The mast required a little staying but it is not in need of repainting. Captain Bartling, the new agent, attends carefully to the work. The harbour master says the daily bulletin is greatly appreciated.

Bridgewater, N. S., 9th May, 1895.—The harbour master here says the daily bulletin is much valued.

Yarmouth, N.S., 10th May, 1895.—The barometer was reading correctly; it was cleaned, as it was getting a little dirty. The anemometer, old pattern with faulty spring contact, was replaced by one of the new ones, and new and heavier wire was furnished for the gauge. The battery was very weak, a further cause of the imperfect working of the gauge. It will be necessary to replace the old storm signal mast, as it is quite rotten and endangering surrounding dwellings. Harbour master reports daily bulletin of much value.

Digby, N.S., 11th May, 1895.—More attention has evidently been given to the storm signal work here of late, as everything was discovered to be in good order. It is not found possible at present to take observations as Mr. Turnbull has no suitable place for the instruments.

St. John, N.B., 13th May, 1895.—All in very good order at this station, and work carefully and conscientiously attended to.

Grand Manan, N.B., 14th May, 1895.—Line to anemometer in very bad shape; nineteen poles require to be replaced by new ones and all wires re-strung. A good position for the anemometer can be obtained on the high ground at the back of the Marble Ridge Hotel, a quarter of a mile from observer's house. If this is proved to be an equally good exposure, the expense of a line to the said point would not cause as great an outlay as repairs to the one existing.

St. Andrew's, N.B., 15th May, 1895.—The barometer was reading .30° lower than the standard. It was leaking slightly through a small hole in the bag. I renovated and cleaned the instrument thoroughly and left it reading correctly. The minimum thermometer again had a detached portion of spirit equivalent to 1.5°.

Fredericton, N.B., 16th May, 1895.—The barometer did not require cleaning. Anemometer and vane quite worn out after their long service and both were renewed. Re-scaled all thermometers.

Truro, N.S., 18th May, 1895.—The barometer was reading correctly, but it was excessively dirty; cleaned it thoroughly, substituting new mercury. All instruments very well exposed and much attention given to the work.

Port Hastings, N.S., 23rd May, 1895.—Minimum thermometer had detached spirit amounting to 6°; thermometer screen all to pieces; no inside receivers to rain-gauge. The observer did not know how to read rain measuring glass—called half an inch an inch, and read all divisions as tenths; says he was instructed so by the late observer now deceased. Signal pole was in need of paint and top of drum box was broken.

Port Hawkesbury, N.S., 23rd May, 1895.—Harbour master reports daily bulletin much appreciated by the fishermen.

Louisbourg, N.S., 24th May, 1895.—Mast was very rotten throughout, it was therefore necessary to call for tenders for a new one, the latter to be fifty feet—ten feet higher than the old one, as growth of surrounding trees was beginning to interfere with the view of it. The mast is placed on the bluff on far shore of harbour in order that fishing vessels off the coast can see it, but unfortunately this entails some delay in the display of signals as the telephone office is a mile and a half distant. Our agent's house is near the mast. The telephone company offer to run a line to agent's house and charge forty dollars per annum rent of telephone, or build line complete for seventy-five dollars. At present we are obliged to pay twenty cents for delivery of each message. Louisbourg is a considerable fishing point, and seemingly promises to soon do a large shipping business. Mr. Patrick O'Toole, custom house officer, is anxious to receive and post the daily bulletin on his wharf.

Port Morien, N.S., 25th May, 1895.—Drum hoisted at night; signal lanterns not used, as harbour hidden from outside and no vessels sail until daylight. Work appears to be carefully attended to. Harbour master's daily bulletin greatly esteemed.

Glace Bay, N.S., 25th May, 1895.—Lanterns likewise not used here, same reason as at Port Morien. Work appears to be properly attended to.

Low Point, N.S., 27th May, 1895.—Wind gauge working well and all in good order.

Sydney, N.S., 27th May, 1895.—Wind gauge apparatus all much worn and will not last much longer. New wet bulb thermometer was required. Work is all well and carefully done.

North Sydney, N.S., May 27th, 1895.—Found drum house broken open, halyards pulled up to top of arm and mast so rotten that no one could safely go aloft to reeve them. The mast is placed on the ridge a little distance from the town proper, and the damage to the drum house and halyards had been the work of the small boy during the absence of the agent, then on leave. A new mast should be erected, and a good stout door and lock on drum house will in all probability stop any wanton destruction in the future.

Pictou, N.S., 29th May, 1895.—Mast needed new guide rope, otherwise all in good order. Minimum thermometer still reads two degrees too low. Harbour master reports weather bulletin much appreciated.

Charlottetown, P.E.I., 30th May, 1895.—It was necessary to replace the old vane and anemometer as both were out of order, all other instruments in good order. Mast was very badly in need of paint, it was also necessary to change one of the stays as it fouled the drums, and drum box had to be higher to prevent rotting of drum and cone owing to damp. Lanterns no use here, as completely obliterated by adjoining electric lamp.

Souris, P.E.I., 31st May, 1895.—Mast in its old secluded position a marked spot for the destructive energy of the miscreant. Mr. Morrow, the agent, offered a plot of land gratis in front of his house and overlooking the wharf, a better position in every way than the old one, his offer was afterwards accepted and the mast removed. On my arrival at Souris the drum house was found broken open, the door torn down and the signals covered with mud.

Chatham, N. B., 4th June, 1895.—Cleaned the barometer, it was not however very dirty. Suitable blocks were needed for the halyards. It is to be hoped that when the ground adjoining the new government building is put in order, permission will be granted to place the instruments there, as their present exposure is very poor.

Beccuinac, N.B., 3rd June, 1895.—The anemograph clock stops frequently, so will have to be replaced; all else in good order and the large anemometer shows no apparent sign of wear.

Shippegan, N.B., 5th June, 1895.—The mast in its present position cannot be seen from the anchorage, where as many as five hundred schooners frequently lay. Not long since the fleet went to sea unaware that the danger signals were displayed and several vessels were wrecked in the storm and lives were lost. The warnings are much appreciated here and it is the general wish that the mast be removed to Indian Point, two miles and a half down the shore and overlooking the anchorage. Mr. McNally the most suitable man to do the work tenders for removal of mast for twenty-five dollars, he will also build the requisite drum house as economically as it can be done. Mr. Duguay, the agent, can neither read nor write and further he told me himself that all autumn (the storm warning season) he was away fishing. Mr. Gogain has all along done the clerical part of the work for Mr. Duguay, and as this is the place above all others where we require a thoroughly good agent, I respectfully recommend that Mr. Gogain receive the appointment and in event of the much desired removal of the mast to Indian Point that he be allowed an equivalent for the increased duties. Mr. Gogain is a very good man for the position and if appointed would do the work thoroughly. At Indian Point there is neither settler, telegraph nor telephone.

Caraquette, N.B., 6th June, 1895.—The mast needed repainting and a new lock was required for drum box.

Bathurst, N.B., 7th June, 1895.—Work apparently as indifferently attended to as ever; barometer was very dirty, coated with sulphur fumes and leaking a little owing to loosening of binding of bag. Observer was making alterations to his dwelling, the reason given for promiscuous way thermometer shed and rain-gauge were scattered about the yard. New halyards were required, together with a lock for the drum box. I recommend that this be a maximum and minimum and rainfall station and that the barometer and other observations be discontinued.

Paspebiac, Que., 8th June, 1895.—Mast will receive the much needed painting that it requires. Mr. Bryan Murray attends faithfully to the duties of agent and Mr. Romeril, manager of the Robins Company, says that the warnings received have been very correct and of great value to them. He would like to see another storm signal station at Grand River.

Gaspé, Que., 12th June, 1895.—All apparatus pertaining to signals in good order, lanterns are of no service as vessels cannot sail until daylight. The drum will be hoisted in future when the warning arrives at night, heretofore for some time signals have not been displayed until daylight, the agent asserting that he had been so instructed. The agent was informed that due attention must be given to reports on Form 10.

Percé, Que., 13th June, 1895.—Mast here barely discernible off harbour on account of its dark colour and back ground. It will be painted white. Drum and cone will receive the necessary repairs.

Dalhousie, N. B., 14th June, 1895.—Mast here a dark colour and close up to centre of government building, very hard to see it from the harbour. It will be painted white, to in a measure improve matters, but it should really be removed to one or other side of the building. The barometer is reading correctly and all instruments are well exposed.

Father Point, Que., 15th June, 1895.—The barometer was reading correctly, but it was so dirty that it was extremely difficult to read it. Everything else in good order.

INSPECTOR H. V. PAYNE.

Quebec, Que., 16th August, 1894.—The time ball at the Citadel had been dropped by hand and the ball and all the apparatus were in a very bad state of repair. Had new running gear and shed made and an air cushion for new ball to drop on. Connected the ball with a new electrical trip apparatus and made connections with the observatory wire, so that the ball is now dropped by electricity direct from the observatory. The storm signal mast was in too bad repair to hoist signals on and required to be thoroughly overhauled. Signals were lying on the ramparts rotting. At the observatory all instruments were tested and found in good order, except the anemometer which was wearing at the spindle—this, however, had been reversed and will last for a time—pointed out some omissions in registers and wrong reading of maximum thermometer.

Roberval, Que., 17th August, 1894.—The volunteer observer had stopped taking observations owing to want of time. Prevailed on the Lady Superior of the Ursuline Convent to take temperature observations, and she will undertake rainfall observations later on if she finds it not too much a tax on her time. Fully instructed her in the work. Instruments were in good order.

Kingston, Ont., 21st August, 1894.—Barometer required cleaning badly, this was attended to and barometer tested with standard. It is now in good order, but previously must have given erroneous reading as it was impossible to set it correctly. Minimum thermometer was reading 2° too low, this was readjusted, other thermometers and wind instruments were in good order. Rain-gauge was not level. Exposure of anemometer and thermometers is not good owing to surrounding trees. Observer was ill at the time.

Mattawa, Ont., 6th September, 1894.—Thermometer and shed in good order. Rain-gauge required to be removed to a better position.

Collingwood, Ont., 10th September, 1894.—Arranged for prompt posting of harbour masters' bulletin at the post office. Harbour master says that shipping men are much pleased with the bulletin. One signal lamp broken, and signal mast and shed required painting.

Dr. Stephen, the volunteer observer, wishes to take humidity observations. Maximum thermometer was reading 1° too high. Other instruments in good order and much interest taken in observations.

Owen Sound, Ont., 11th September, 1894.—Signal shed required slight repairs. All the signals and masts in good order. Arranged for harbour masters' bulletin to be posted regularly on the main wharf.

Presqu'Isle, Ont., 12th September, 1894.—Anemograph was in good order, but anemometer required a new spindle which was worn out. The signal mast is propped and stayed, but is rotten at the base and will soon be useless. Signals in good order.

Tobermory, Ont., 14th September, 1894.—New signal shed was required and mast painting. A windlass is also required as the mast is seventy feet high. The bolt of one stay had drawn out of the rock and a new hole was bored and staff set up. Two anemographs, anemometers and vane were taken away and returned to central office as no use had been made of them by the agent. The fishermen speak

highly of the storm warnings and daily bulletins, but complain that our agent, the telegraph operator, is not always on hand to send or receive telegrams.

Saugeen, Ont., 18th September, 1894.—The anemograph was not working satisfactorily and required adjusting. Barometer and all thermometers tested with standard and found satisfactory. Other instruments in good order.

Kincardine, Ont., 19th, September 1894.—Minimum thermometer C. 754 was reading 2° too low. Maximum thermometer 9498 is a very old instrument and reads 3° too high as tested with standard. Other instruments and signals in good order. Mast required painting and some new running gear.

Goderich, Ont., 20th September, 1894.—Present mast has a bad list and the arm broken off. This was being repaired when I arrived. Mast will last for a time yet, but will require replacing before long. A new stick had been obtained but was not sound and was condemned. Agent will look out for a new stick during the winter. A new cone is required, other signals in good order. Agent complains of the signal lamps going out in high winds. Anemometer shafting required slight repairs.

Bayfield, Ont., 20th September, 1894.—There is a good signal shed here, but the signals had not been taken proper care of. Mast, shed and signals required painting. New cone and rigging will be required in the spring.

Woodstock, Ont., 21st September, 1894.—Anemometer working all right. Minimum thermometer not working properly owing to not being placed in proper condition. Improved cylinder required for anemograph.

Fergus, Ont., 22nd September, 1894.—The volunteer observer was ill and wished to give up observing, instruments were therefore taken away.

Port Dalhousie, Ont., 27th September, 1894.—Signals and mast all in good order, but mast will require painting in the spring. Arranged for harbour master's bulletin to be posted regularly at the custom-house.

Port Colborne, Ont., 28th September, 1894.—The mast has a list and owing to closeness of roadway it is impossible to run stays far enough apart to be of much service. Running blocks are set inside arm and stick; outside rigging is required, and the mast wants painting. The signal lamps smoke, but this was owing to wrong chimneys being used. Complained about reports not being sent in regularly.

Thorold, Ont., 28th September, 1894.—Minimum thermometer had spirit detached—this was rectified. All the other instruments in good order and well placed.

Wanstead, Ont., 24th April, 1895.—Volunteer observer had been away but promised to resume observations if the instruments were left. All the instruments were in good order, but the thermometer shed required painting.

Sarnia, 25th April, 1895.—Signal mast and signals all in good order but mast required painting. Harbour master's bulletin much appreciated here.

Pelee Island, Ont., 26th April, 1895.—The anemometer is working, but owing to faulty construction is continually getting out of adjustment. Anemograph gets very weak current through north and east coils—it would be better to rewind it. Connecting wires from lighthouse to dwelling house require to be replaced. Mast and signals all in good order. Jack-stay required for mast.

Amherstburg, Ont., 27th April, 1895.—The present signal mast is a poor affair and is now completely shut out by newly constructed coal chute. Would recommend that new mast be placed on waterworks wharf which is the best position and can be rented for less than the present one. Pointed out the necessity for sending fuller reports. Harbour master's bulletin much needed and will be posted regularly at post office. Signals all in good order.

Ridgetown, Ont., 30th April, 1895.—Volunteer observer had ceased observing owing to some misunderstanding, will continue observations if sent a barometer.

Port Dover, Ont., 1st May, 1895.—Took away old thermometers M. O. 31 and C. 2. Other instruments in good order. Mast required painting. Signals all in good order.

F. N. DENISON.

Port Stanley, Ont., 18th March, 1895.—Anemograph not recording, found the observer had placed cotton batting in the gravity cells, between the zinc and copper

which reduced the electrical output to a minimum; removed batting and cleaned zincs, after which anemograph worked well. Cleaned and oiled anemometer, everything else in good order.

MAGNETIC OBSERVATORY.

WILLIAM SMITH, Esq.,
Deputy Minister, Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit herewith the report on this observatory for the fiscal year ended 30th June, 1895.

During the year the regular routine magnetical and meteorological observations have been carried on as in past years, and the self-recording magnetographs have been kept in operation, as likewise have the barograph and thermograph. Field observations made at a point about two hundred yards magnetic north of the observatory, well removed from all influence of buildings, begun in May, 1894, were continued in July and September, and again in May and June, in order to determine the amount of the effect of the new school of science on the various magnets in the observatory.

The determinations made in this manner have shown that all the magnets are affected, and constant corrections will have to be applied. In addition to this effect the electric car circuits on week days keep the magnets in constant vibration, the amount of which, however, is very small and does not seriously affect the value of the photographic traces, the true magnetic changes can be obtained nearly, if not quite as well as before the cars were running, but these vibrations do necessitate the making of all absolute determinations on Sundays as well as on week days, exact readings of the differential instruments are impossible. The value of the magnetic observations at Toronto Observatory, while slightly impaired by the erection of the neighbouring building and by electric circuits is not, I consider, very seriously diminished. Since November last we have charted the magnetic daily, mean absolute values on millimetre paper and thus have continuous curves which with daily observations of the sun spots made with the six-inch equatorial, will I hope, be valuable data for the investigation into the cosmical relations manifested in the simultaneous disturbances of the sun and the terrestrial magnetic field.

Since November, the value of the magnetic elements have each day been sent to Washington, where they are used with those of other magnetic observatories, in an investigation into the relationship between meteorological and magnetical phenomena.

The most important magnetic disturbances were recorded on the 2nd, 17th and 20th of July, the range of declination on the latter date being $1^{\circ} 49' 4''$. August 20th an unusually heavy disturbance, the range being over $3^{\circ} 48'$ in a short time. September 14th and 19th, November 13th, December 15th, February 9th, 15th and 16th, April 11th and May 29th.

TIME SERVICE.

During the year ending June 30th, 1895, observations of stars in the meridian for time on 99 days were taken at the Toronto Observatory, in which 484 stars have been observed. The positions of the stars as given in the "Berliner Jahrbuch" have as formerly been used in the reductions. Two solar transits have also been taken for time during intervals of cloudy nights.

Determinations of the collimation error of the transit instrument have frequently been made, chiefly by micrometrical measurements on the cross wires in the collimating telescope.

Preparations were made to observe the transit of Mercury across the disc of the sun on the 10th of November, but owing to cloudiness and other causes the contacts could not be observed. A meridian transit of Mercury on the face of the sun was observed across the wires of the transit instrument on the 10th, and also near its eastern and western elongations, these observations were taken to test the accuracy of its tabulated positions as given in the almanac.

Regular sun spot observations were commenced on March 29th, 1895. The sun was seen through the six-inch equatorial telescope, using a magnifying power of about 50, being projected upon paper forming an image four inches in diameter, the spots are then sketched in and located by means of two lines drawn through one of the spots across the surface of the sun by the slow motion screws in declination and R. A., the driving clock meanwhile keeping the telescope steadily following the sun. Observations on 66 days have been made during the period extending from March 29th to June 30th, inclusive. These observations have been taken as soon after 10 a.m. as the state of the sky permits.

The exchange of time between the observatories at Montreal, Quebec, St. John and the Toronto Observatory have taken place as usual, the comparisons being registered on the chronograph. The errors of the clock at Toronto, and the different timepieces used by the observers, being computed from the latest observations.

The time has also been given regularly on time exchange days to Halifax.

The examination of the clock and chronometer comparisons and observations sent in from the observatories at Quebec and St. John has been performed.

The following table shows the difference between the time by "Standard Observer" and that given at the various exchanges. The sign + indicates that the time as sent from the various observatories is faster than that by the "Standard Observer."

		Toronto.	Montreal.	Quebec.	St. John.
1894.		Seconds.	Seconds.	Seconds.	Seconds.
July	5.				-2.29
do	18.	+0.14	-0.14	-0.72	-0.85
do	31.	-0.06	+0.06	+0.89	-0.75
Aug.	17.	+0.13	-0.13	-1.32	-0.85
do	31.	+0.12	-0.12	+1.00	+0.78
Sept.	14.	+0.03	-0.03	+0.24	-1.24
Oct.	1.			-0.78	-0.56
do	18.			-0.88	-0.84
Nov.	8.	+0.07	-0.07	+0.43	
do	23.	0.00	0.00	+0.22	+1.32
Dec.	14.	+0.24	-0.24	+4.07	-0.10
do	31.	+0.32	-0.32	-1.55	-0.66
1895.					
Jan.	15.	+0.39	-0.39	-1.20	-0.09
do	31.	+0.34	-0.34	+2.40	-0.23
Feb.	13.	+0.36	-0.36	-2.39	+0.98
do	26.	+0.36	-0.36	+0.58	-0.08
Mar.	12.	-0.49	-0.49	-0.03	-0.63
April	2.	+0.44	-0.44	+0.76	-0.18
do	18.			+0.30	-1.40
May	2.	+0.51	-0.51	+0.38	-1.13
do	16.	+0.25	-0.25	+2.47	-1.95
June	10.	+0.13	-0.13	-3.95	
do	11.				-0.52
do	25.	-0.30	-0.30	-0.03	+0.05

APPENDIX B.

QUEBEC OBSERVATORY,
QUEBEC, QUE., 1st August, 1895.

The Director,
Meteorological Service,
Toronto.

SIR,—I have the honour to transmit my annual report for the fiscal year ending 30th June, 1895.

The meteorological observations have been regularly taken daily at the observatory, with the exception of the bi-hourly temperatures, which have been continued on the citadel as formerly.

The correct time has been daily given to the city by means of the noon gun, and to the shipping during the navigation season, by means of the ball at 1 p.m., local time.

Certain changes have been made in connection with the time service. The old time ball has been replaced by a new one, and the old cushion upon which the ball falls, by a compressed air cushion; and since the 25th of August last the ball has been dropped directly from the observatory by means of an electrical attachment thus preventing errors which may have occurred formerly. There has, however, been some failures of the ball owing to the breaking of the chain which has now been replaced by a stronger one. The whole is now in perfect order.

The electrical attachment is also used to give the noonday gun signals, by means of a semaphore which is placed on the time ball mast.

Certain repairs have been made to the shutters of the transit room at the observatory, and also to the roof of the equatorial tower in order to preserve the instrument from the inclemency of the weather.

I have the honour to be, sir,
Your obedient servant,

ARTHUR SMITH.
Director.

APPENDIX C.

ST. JOHN OBSERVATORY,
ST. JOHN, N.B., 1st August, 1895.

R. F. STUPART, Esq.,
Director, Meteorological Service,
Toronto.

SIR,—I have the honour of presenting my annual report on the St. John Observatory for the year ending 30th June, 1895.

In connection with the time service, observations for the correction of clock errors and rates were frequently made with the old transit instrument referred to in my last report and were not as satisfactory as I should desire.

The new transit instrument arrived in May last from Messrs. Troughton and Simms, London, but owing to some necessary alterations to transit pier it was not mounted until the latter part of June. The instrument has an object glass of two and a half inches diameter and about thirty inches focal length, two setting circles divided on silver attached to the telescope, clamp and slow motion screws, micrometer, striding level with cross level, two ordinary and one rectangular eye-piece, lamps, &c., mounted on cast iron stand to be bolted to stone pier. The instrument is well finished and will no doubt prove most accurate and reliable.

The time ball as formerly reported has been dropped every week day at the instant of 1 p.m. local time at the observatory.

The chief station routine of meteorological observations have been continued as heretofore reported.

Since February last I have been receiving a daily weather bulletin by wire from Toronto, which contains a synopsis of the weather throughout the continent, the morning probabilities as well as the 8 a.m. weather report from stations covering the coast from Chatham to Boston. These bulletins are posted, distributed and published by the daily newspapers. In addition to this bulletin the daily newspapers publish our local weather report. The bulletins are very much appreciated and there is a growing and increasing demand from the public for information regarding the weather.

I trust that you will soon be able to arrange for the publication of a daily weather map in the Maritime Provinces. Such a map would be of great value to the shipping interest and others and would very much increase the usefulness of this service in eastern Canada.

I have the honour to be, sir,
Your obedient servant,

D. L. HUTCHISON,
Director.

APPENDIX D.

MCGILL COLLEGE OBSERVATORY.

MONTREAL, 14th January, 1896.

The Honourable

The Minister of Marine and Fisheries, Ottawa.

SIR,—I have the honour to present my report on the McGill College Observatory, Montreal, for the year ending 31st. December, 1895.

The usual meteorological observations have been made during the year, and the results published in the *Montreal Gazette* and the *Canadian Record of Science*. The reduction of the bi-hourly series of temperature for the ten years, 1885-1894, has been completed and the average daily curves for each month plotted. It may be interesting to note that the curves exhibit a defect of temperature in the afternoon, due most probably to the position of the observatory, on the eastern slope of Mount Royal. A synopsis of the results of the year and the bi-hourly means referred to, are presented herewith.

Determinations of clock errors were made on 129 nights by the observation of 747 stars. The noon-time ball has been regularly dropped at mean noon of the fifth hourly meridian during the period of navigation. The Observatory time signals have also been distributed as in former years throughout the city and country. There have been exchanges of clock signals with the Toronto Observatory on twenty days, on which the average difference of the time of the two observatories was found to be 0.33 second and the greatest difference 0.76 second.

I have the honour to be, sir,
Yours very truly,

C. H. McLEOD, *Director.*

APPENDIX No. 5.

REPORT OF THE CHAIRMAN, OF THE BOARD OF STEAMBOAT
INSPECTION.

OTTAWA, October, 1895.

Hon. JOHN COSTIGAN,
Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit herewith my annual report of the proceedings of the Board of Steamboat Inspection, for the year ending 30th June, 1895.

The report contains the total number of steamboats in the Dominion known to the inspectors; form No. 1, showing the steamboats which were inspected, and form No. 2, the steamboats not inspected; form No. 4, shows the number of steamboats added to the Dominion, and form No. 5, the number of steamboats lost, broken up or otherwise put out of service.

In addition to the number of steamboats inspected at the port of Montreal, there has also been inspected by the steamboat inspectors of that port, the ships tackle and hoisting gear of 185 vessels. Twelve of the vessels were found in bad condition and were repaired; three others were bad and condemned.

Tables A, B and C show the total number of steamboats in the Dominion and their gross tonnage; the amount of dues and fees collected, and the number of steamboats added to the Dominion, with their gross and registered tonnage.

A.—NUMBER of Steam Vessels inspected and not inspected, reported by the Inspectors of Steamboats in the Dominion and their gross tonnage, during the year ending 30th June, 1895.

DIVISION.	Number of Vessels.	Gross Tonnage.
West Ontario, Huron and Superior	343	73,283 00
Kingston.	153	22,075 56
Montreal ...	152	19,468 07
Quebec	156	41,691 00
Nova Scotia.....	123	28,683 80
New Brunswick and Prince Edward Island.....	129	19,125 23
British Columbia.....	134	20,843 83
Manitoba, Keewatin and North-west Territories.....	83	6,889 74
Total	1,273	232,060 23

B.—DUES and Fees collected on account of Steamboat Inspection during the year ending 30th June, 1895.

DIVISION.	Amount.
	\$ cts.
West Ontario, Huron and Superior.....	7,189 82
Kingston.....	2,572 65
Montreal.....	2,356 11
Quebec.....	4,066 96
Nova Scotia.....	2,743 64
New Brunswick and Prince Edward Island.....	1,939 26
British Columbia.....	2,119 60
Manitoba, Keewatin and North-west Territories.....	703 52
Inspecting tow barges.....	80 00
Engineers' certificates.....	859 00
Total.....	24,630 56

C.—NUMBER of Steam Vessels added to the Dominion during the year ending 30th June, 1895.

DIVISION.	Number of Vessels.	Gross Tonnage.	Register Tonnage.
West Ontario, Huron and Superior.....	8	2,658 00	1,772 00
Kingston.....	8	1,660 79	935 67
Montreal.....	4	702 43	270 10
Quebec.....	4	109 76	76 69
Nova Scotia.....	8	1,331 55	728 00
New Brunswick and Prince Edward Island.....	9	3,852 42	2,625 19
British Columbia.....	9	1,707 91	1,099 33
Manitoba, Keewatin and North-west Territories.....	10	455 06	324 18
Total.....	60	12,477 91	7,831 16

BOARD MEETINGS.

A meeting of a quorum of the Board of Steamboat Inspection was held at Kingston from 12th to 25th July inclusive, being composed of Inspectors John Dodds, of Toronto, Joseph Samson, of Quebec, with the chairman, E. Adams. The meeting was held for the purpose of examining candidates for the position of steamboat inspectors.

Two candidates who applied for engineers' certificates, were also examined and passed during the sitting of the board.

August 9th, 1894.—A quorum of the board met at Montreal from the 9th to 17th inclusive, composed of Inspectors Joseph Samson, Quebec; Wm. Laurie, Montreal, and E. Adams, chairman, for the purpose of examining Thos. P. Thompson of Sorel, for the position of steamboat inspector. Mr. Thompson passed his examination satisfactorily. Three applicants for engineers' certificates also passed.

October 2nd, 1894.—A quorum of the Board met at Halifax from the 2nd to 10th inclusive, the members present were Inspectors W. L. Waring, St. John, N.B.; D. Stevens, Halifax, N.S., and E. Adams, chairman. The meeting was held for the purpose of examining candidates for the position of steamboat inspector.

February 14th, 1895.—The board, again composed of the former members convened at Halifax from the 14th to 26th inclusive. It being for the purpose of examining candidates for the position of steamboat inspector. Mr. Esdaile satisfactorily passed the examination.

INSPECTORS APPOINTED.

During the year the personnel of the staff has undergone changes.

On the retirement from the service of the late chairman June 30th, 1894, I had the honour of being promoted to that responsible position, assuming the duties of the office July 1st, 1895. This caused a boiler and machinery inspector vacancy on the board of Steamboat Inspection for eastern Ontario division.

To fill this vacancy, Mr. Thos. P. Thompson of Sorel, P.Q., who passed a satisfactory examination at Montreal, 17th August, 1894, was appointed to the position of boiler and machinery inspector for steamboats, to reside at Kingston, by Order in Council of 29th August, 1894, at a salary of \$1,000 per annum.

Mr. Thompson assumed the duties of the office 18th September, 1894.

On account of the death of the late Capt. Thomas Harbottle of Toronto, on October 12th, 1894, the office of hull inspector at that port was rendered vacant, and an appointment was necessary to fill the vacancy.

The candidates who offered for the position were examined at Toronto, December 20th, 1894, by a board of examiners especially appointed for that purpose under the Act 49 Vic., chap. 78, sec. 7.

Mr. Wm. Evans of Deseronto, being reported as having passed the most satisfactory examination, was appointed an inspector of hulls and equipment of steamboats, to reside at Toronto, with a salary of \$1,000 per annum, by Order in Council, 31st January, 1895. Mr. Evans assumed the duties of the office on 25th February, 1895.

Owing to the appointment of Mr. D. Stevens at Halifax, N.S., to be employed for the special supervision of government steamboat work, Mr. J. P. Esdaile of Charlottetown, P.E.I., who passed a satisfactory examination at Halifax, 26th February, 1895, was appointed to the position of boiler and machinery inspector of steamboats, to reside at Halifax, with a salary of \$1,000 per annum, by Order in Council, 29th June, 1895. Mr. Esdaile assumed the office duties at Halifax on 15th July, 1895.

CASUALTIES.

West Ontario and Huron Division.

August 20th, 1894.—Str. "Lake Michigan," of Hamilton, while en route from Montreal to Port Arthur, when about thirty miles west of Sault Ste. Marie, broke her crank shaft close to the after bearing. The steamer returned to Sault Ste. Marie, and new shaft was procured.

September 9th, 1894.—Str. "Atlantic," of Collingwood, when returning to Collingwood from Sault Ste. Marie, and near Lion's Head, Georgian Bay, broke her crank pin. This caused the breaking of the entablature between the high and low pressure cylinders, and the bed plate of engine. The low pressure cylinder and crosshead were also cracked.

The steamer was towed to Collingwood where the necessary repairs were made.

September 13th, 1894.—Str. "Enterprise," of St. Catharines, on a voyage from Fort William to Kingston, ran ashore on North Point reef near Alpena, Mich. The steamer was abandoned by the owners.

June 7th, 1895.—Str. "St. Magnus," of Hamilton, while loading at the dock at Cleveland, Ohio, capsized.

East Ontario Division.

October 19th, 1894.—While Str. "North King" was lying at the dock a flaw was discovered in the starboard shaft by the engineer, she proceeded to Kingston

under check for repairs. On examination the port shaft showed a similar defect, and both were replaced by new ones.

March 12th, 1895.—Str. "Rideau Belle," while lying in winter quarters at Sand Lake, caught fire and was totally destroyed.

May 9th, 1895.—Str. "Jack," of Kingston, while proceeding up the Welland Canal collided with the lock gates, breaking her stem and some frames on port side; she was repaired and proceeded on her voyage.

On May 30th, 1895, same vessel while proceeding down Lake Huron, collided with str. "Norman," of Cleveland, sinking the latter steamer, whereby three of her crew were lost. The str. "Jack" having a cargo of timber did not sink and was towed to a port of safety. She is now being repaired.

Montreal Division.

September 13th, 1894.—Str. "Laurier," of Montreal, while lying at the dock in Montreal caught fire and was partially burnt; cause unknown; amount of damage, \$200.

June 14th, 1895.—Str. "G. H. Perley," of Ottawa, while towing on Chat Lake took fire and was a total loss; cause of fire supposed to be a torch lamp igniting a barrel of coal oil which caused the flames to spread so rapidly that it was with the greatest difficulty the crew made their escape; amount of damage valued at \$20,000.

Quebec Division.

October 10th, 1894.—The tug "C. S. Parnell" while moored at the wharf at Quebec was run into by the ferry steamer "Pilot" and sunk, no person being on board, and was reported as not having had up her lights.

March 16th, 1895.—Ss. "Greetlands," on a voyage from New York to Cardenas, broke her shaft nine inches inside the sleeve and lost her propeller, made Jacksonville under sail, when a new shaft and propeller were fitted.

June 8th, 1895.—Str. "Como," on a voyage to Gentilly, got aground on a rock, filled with water and sank, was again floated with the aid of bateaus and repaired.

Nova Scotia Division.

No accident of any importance occurred in this division.

New Brunswick and Prince Edward Island Division.

On the morning of August 20th, 1894, the tug "Maggie" when on a voyage from St. John to Alma, Albert Co., New Brunswick, went ashore in a dense fog. Four of the crew were drowned.

British Columbia Division.

July 4th, 1894.—The boiler of the str. "Queen," of New Westminster, when en route up the North Thompson River exploded, wrecking the vessel and causing the death of the fireman. From the investigation held, there was grave reason to suspect the cause of explosion was due to tampering with the steam gauge and safety valves.

On account of the total destruction and disappearance of boiler and mountings it was impossible to verify the suspicion, and it is to be regretted that any person guilty of committing such a reckless deed, "if such was done," should go unpunished.

August 2nd, 1894.—Str. "Saturna" caught fire in False Creek, Vancouver, destroyed the deck and partially destroyed the hull; was afterwards repaired and inspected, October 10th. Cause unknown.

September 27th, 1894.—Str. "Swan" was run into and damaged by str. "May Queen," this was caused by the master of "May Queen" after giving the signals, placing his helm to the wrong side. The planks, frames and beams were broken, but were repaired satisfactorily.

October 8th, 1894.—Str. "Mischief," on a voyage from Alaska encountered a severe gale, received damage to the extent of springing her mast at main deck, also her planking, thereby starting to leak, and was with difficulty brought to Victoria where she was repaired.

January 15th, 1895.—Str. "Clara Young," on a voyage to Skeena River stranded near Metlah-Cathla, damaging several planks on starboard side and breaking the frames, also losing propeller wheel. She was brought to Victoria and repaired, 13th March.

March 22nd, 1895.—Str. "Velos," on a voyage to Haddington Island with barge "Pilot" in tow, was driven ashore on Trial Island during a severe gale. She was broken up and became a total wreck, causing the loss of five lives.

April 19th, 1895.—While str. "Comet" was on a trip from Lagging Camp, Thurlow Island, to Vancouver the propeller wheel collided with floating logs, thereby breaking wheel, outer bearing and bending shaft, the vessel was taken to Vancouver for repairs.

May 12th, 1895.—Str. "Mogul" while towing a vessel struck her a glancing blow and started the stem of steamer; to save steamer from sinking the master beached her. A strong gale sprang up same evening, the seas pounded the vessel on the rocks when she became a total wreck.

June 17th, 1895.—Str. "Belle," at Woodwoods Slough, Fraser River, struck a snag with propeller wheel, breaking the shaft close up to stern bearing and losing it. She was towed to Westminster where a new shaft and wheel were fitted.

Steamers "Coquithan," "Vancouver" and "Joan," met with slight accidents of minor importance.

Manitoba, Keewatin and North-west Territories.

August 19th, 1894.—Str. "Monarch" ran aground in the Sault Rapids, Rainy River, was floated with little damage.

Same steamer on the 5th June, 1895, while running the same rapids swung around and got on the rocks, smashing the planking of the hull, was released on 1st August, put on the marine railway and repaired.

June 11th, 1895.—The steamers "Enda Brydges" and "Algoma," collided in the narrows on the Lake of the Woods, escaping with very trifling damage being done.

PROSECUTIONS FOR VIOLATION OF THE STEAMBOAT INSPECTION ACT.

Proceedings ordered and results in each case.

July 6th, 1894.—Tug "Squaw." Mr. J. B. Smith, the owner, was charged with running said steamer during the twelve months previous, having had a man employed as captain and in charge not having the necessary certificate as required by law.

The case was tried by J. A. Champagne, recorder of Hull, when he was convicted and fined \$100 and costs. The fine was paid, with costs to the amount of \$20.

Again, on September 9th, the following charges were made: 1st. That Mr. Smith, during the months of June, July and August, plied his steamer without a certificated master; 2nd. That he neglected to have his boat inspected; 3rd. That he ran his boat without having such inspection made.

The cases were tried before the Recorder of Hull, and on all three charges the owner was convicted and fined, with costs, on 1st charge, \$100; 2nd, \$400; 3rd, \$50.

The Honourable Minister of Justice, on hearing the explanation made by defendant and also an explanation from the magistrate who inflicted the fines, considered under the circumstances, in lieu of the fines a charge of what might cover the costs be collected, viz., \$145, which was paid to the department, 12th June, 1895.

July 9th, 1894.—Ss. "Garden City," of Toronto, violated the law by carrying a greater number of passengers than that allowed by her certificate. Proceedings were ordered to be taken against the owners. The case was tried at Toronto, July 18th, and a conviction obtained for a penalty of \$100, which was paid by Bank of Montreal cheque, 31st July, 1894.

July 31st, 1894.—Ss. "Macassa," of Hamilton, violated the law by carrying a greater number of passengers than that allowed by her certificate. Proceedings were taken and the case was tried in the police court at Toronto on the 8th of August. The defendants pleaded for an adjournment for three weeks, and an adjournment of two days was granted. A conviction was obtained and a fine of \$250 and costs imposed against the captain, which was paid 25th September, 1894.

August 3rd, 1894.—Tug "Eileen," of Ottawa. Proceedings were ordered to be taken against the owner for violation of the Steamboat Inspection Act. The case was brought before Judge O'Brien at Casselman, 14th September, 1894, when the defendant confessed judgment, was fined \$50 and \$5 costs, which was paid to the department by cheque, September 20th, 1894.

August 8th, 1894.—Str. "Emulator," of Toronto. For violation of the steamboat inspection law, proceedings were ordered to be taken against the owner, who admitted having carried passengers without having had a certificate to do so. In view of the circumstances laid before the Honourable Minister of Marine and Fisheries, he was pleased to direct that the proceedings might be stayed on Mr. Walton, the owner, paying the minimum penalty, \$50, and the amount of costs incurred, which was paid by post office order, 12th October, 1894.

August 13th, 1894.—Str. "Shamrock." Proceedings were taken and information laid against the president of the Toronto Ferry Company for carrying more passengers than allowed by their certificate.

The case was adjourned from time to time, when finally, on September 7th, the defendant was convicted and a fine of \$50 imposed, which was paid by cheque, 25th September, 1894.

August 27th, 1894.—Str. "Mazeppa," of Toronto, violated the law by running beyond the limits permitted by her certificate with passengers. Proceedings were instituted against the master, Thos. Lundy, jr., before the police magistrate at Hamilton. The defendant pleading guilty, a penalty of \$50 and costs were inflicted, which was paid by the Hamilton Steamboat Company, 6th November, 1894.

August 30th, 1894.—Str. "Acacia," of Hamilton—proceedings were ordered to be taken against the owners for running in violation of the law. The case came before the police magistrate at Hamilton, 12th September, 1894. The owners pleaded guilty to the charge of going beyond the limits of the waters for which they held a certificate. The magistrate imposed a penalty of \$50 and costs, which was paid by cheque, 24th October, 1894.

September 4th, 1894.—Str. "Adie Alice," of St. Catharines—proceedings were taken against the owner, Wm. Julian, charging him with carrying on two different occasions more passengers than those allowed by her certificate. Upon the first charge the defendant was acquitted, on the second he was convicted and a fine of \$50 and costs imposed.

From this the defendant has appealed and the case is to be tried at a sitting of the Court of General Sessions.

September 21st, 1894.—Tug "Commodore," of Charlottetown, P.E.I.,—proceedings were taken against the owner before the stipendiary magistrate of that place, for carrying passengers without the necessary certificate authorizing such. Also for having a master in charge not holding a certificate as required by law.

The defendant in each case was fined \$50 and costs, to be paid in ten days, in default of such to be imprisoned for one month. The fine has not yet been paid, defendant having left the country.

September 24th, 1894.—Ss. "Greetlands"—proceedings were taken against Messrs. Ross & Co., owners, for running the steamer without a certificate of inspection and a fine of \$400 was imposed. The case was carried to appeal, which was heard on the 6th May, 1895, and the previous judgment was confirmed. The amount of fine was deposited to the credit of the Receiver General, 31st May, 1895.

September 29th, 1894.—Str. "Bonita"—proceedings were ordered to be taken against her for violation of the law, in not having a certificated master and having no small boat as required by law. The complaint against the defendant for not having a small boat was heard at L'Original on the 18th October, 1894, when a fine of \$50 and costs was inflicted, which was paid by draft of December 4th, 1894.

On payment of the fine, the department did not consider it necessary to press the other charge.

I have the honour to be, sir,
Your obedient servant,

EDWARD ADAMS,
Chairman Board of Steamboat Inspection.

APPENDIX No. 6.

LIVE STOCK SHIPMENTS.

Record of Live Stock shipped from Port of Halifax, N.S., from 1st January to 1st December, 1895.

Number.	Date.	Steamer.	Destination.	SHEEP.			CATTLE.			Fees collected.		HORSES.		SWINE.		Hay for Feed.	Grain for Feed.	Number Men.
				Shipped.	Lost.		Far.	Stockers.	Total.	Lost.	\$ cts.	Shipped.	Lost.	Shipped.	Lost.			
1	Feb. 9.	Oregon.	Liverpool			181			181		5 43							7
2	do 16.	Mongolian.	do			30			30		0 90							2
3	Mar. 2.	Laurentian.	do			152			152		4 56							6
4	do 16.	Munidian	do			300			300		9 00							10
5	do 30.	Mongolian	do			322			322		9 65							10
6	April 11.	Brazilian	do			445			445	2	13 85					118,825	37,900	19
7	do 27.	Bordier	London.			600			600		18 00					136,000	42,000	24
8	do	Munidian	Liverpool			329			329	1	9 87					56,000	19,040	13
9	Nov. 2.	Halifax City	London									22						
						2,359			2,359	3	70 77	22						91

Record of Live Stock shipped from Port of Montreal during month of May, 1895.

1	May 3.	Mariposa.	Liverpool			185			185		5 55					53,440	20,000	10
2	do 5.	Pomeranian.	Glasgow	146		400			400		13 46	219				103,460	35,620	17
3	do	Baltimore	Liverpool			691			691		21 26					167,360	61,924	29
4	May 8.	Alcidis	Glasgow	700		346			346		17 88	112				105,580	42,790	16
5	do	Dominion.	Bristol.			431			431		12 03					108,510	38,200	17
6	do	Christiania	London.			370			370		11 10					98,940	33,540	15
7	May 10.	Fronona.	do			482			482		14 46	109				135,030	35,170	20
8	do	Austrian.	do			379			379		11 37	91				119,563	47,618	16
9	May 11.	Laurentian.	Liverpool			645			645		19 36	42				163,980	62,856	27
10	do	Parkmore.	do	32		630			630		10 22	74				155,125	59,000	27
												*59						
11	May 12.	State of Georgia.	Newcastle	347		201			201		12 20	41				97,500	20,350	15

12	do	13	Crynthiana.	Liverpool	532	15 96	137,360	44,450	20
13	do	14	Sarmatia.	Glasgow	400	12 00	90,300	32,370	16
14	do	16	Tritonia.	do	507	22 68	147,240	56,760	23
15	do	16	Memphis.	Bristol.	338	10 14	83,192	29,220	13
16	May 17	British Prince.	Liverpool.	411	12 33	1	102,790	34,160	13
17	do	18	Montevideo.	London.	420	12 60	123,625	46,235	16
18	do	18	Lake Superior	Liverpool.	601	19 59	142,995	53,090	27
19	do	18	Merrimac	London.	480	14 40	143,410	43,090	19
20	May 19	Hurona.	do	654	19 62	62	214,106	66,810	26
21	do	19	Buenos Ayrean	Glasgow	400	12 00	82,450	29,040	16
22	May 22	Scotia.	London.	355	12 18	174	100,000	36,000	15
23	do	22	Escalona.	Cherbourg	364	10 92	126,500	27,650	14
24	do	23	Concordia.	Glasgow	400	19 47	130,128	50,390	19
25	May 23	Avlona.	Newcastle	300	9 00	30	80,940	30,450	13
26	do	23	Mexico.	Bristol.	320	9 60	80,580	28,870	12
27	May 24	Gerona.	London.	454	14 16	38	133,870	47,534	18
28	do	24	Messmore	Liverpool	492	14 76	114,080	46,620	17
29	May 25	Mongolian.	do	609	18 27	18	150,000	54,000	24
30	do	26	Norwegian.	Glasgow	400	12 00	100,990	36,110	16
31	do	26	Lake Winnipeg	Liverpool	540	12 00	138,120	38,740	21
32	May 29	Brazilian	London.	494	14 82	16	138,590	47,130	20
33	do	29	Amaryntha.	Glasgow	399	19 28	118,160	69,450	19
34	May 30	Montezuma.	London.	473	15 09	198	172,900	42,420	32
35	do	30	Oregon.	Liverpool	414	14 82	97,900	34,800	18
36	do	30	Otolia.	Bristol	280	8 40	78,000	26,000	11
				4,450	521 11	1,997	4,442,604	1,526,357	669
				9,370	523 93	982			
				101	306 72	296			
				391	334 22	611			

*On Labrador.

37	June 1	Numidian	Liverpool	602	18 06	27			
38	do	2	Lake Ontario.	do	13 70	134			
39	do	2	Dracon.	Newcastle	300	9 00	32		
40	do	2	Siberian	Glasgow	397	11 91	117		
41	do	4	Warwick.	do	308	16 63	61		
42	do	5	Assaya.	London.	260	11 20	118		
43	do	7	Baltimore	Liverpool	697	20 91	18		
44	do	7	Palmas.	Bristol	234	9 02			
45	do	7	Mariposa.	Liverpool.	200	9 85	10		
46	do	7	Iona.	London.	423	14 65	105		
47	do	8	Rosarian	do	375	14 57	75		
48	do	12	Lake Huron.	Liverpool.	393	15 71	100		
49	do	12	Pomeranian.	Glasgow	400	13 49	99		
50	do	13	Aleides.	do	399	18 49	59		

Record of Live Stock Shipped from Port of Montreal during 1895—Continued.

Number.	Date.	Steamer.	Destination.	SHEEP.		CATTLE.				HORSES.		SWINE.		Hay for Feed.	Grain for Feed.	Number of Men.
				Shipped.	Lost.	Fat.	Stockers.	Total.	Lost.	Shipped.	Lost.	Shipped.	Lost.			
	1895.									\$ cts.				Lbs.	Lbs.	
51	June 14	Parkmore.	Liverpool.	755				674		27 77		40				
52	do 14	Dominion.	Bristol	845				289		17 12						
53	do 15	Laurentian	Liverpool.	206				677		22 37		226				
54	do 16	Austrian.	London.					352		10 56		137				
55	do 19	Sarnatian.	Glasgow					400		12 00		139				
56	do 19	Lake Superior	Liverpool.	843				370		19 53		117				
57	do 20	Tritionia	Glasgow	1,302				401		25 05		33				
58	do 20	Canadia.	London.	237				338		12 51		35				
59	do 21	Memnon.	Bristol	878				304		17 90						
60	do 21	Fremona	London.	762				267		15 63		95				
61	June 23	State of Georgia	Newcastle	437				238		11 51		90				
62	do 23	British Empire	London.	527				442		18 53		112				
63	June 26	Lake Winnipeg	Liverpool	801				460		21 81		24				
64	do 26	Buenos Ayren	Glasgow					400		12 00		80				
65	do 26	Montevidean	London.					371		11 13		103				
66	June 27	Hispania	do	819				186		13 77		109				
67	do 27	Concordia	Glasgow	467				400		17 05		26				
68	do 28	Memphis	Bristol					343		14 96						
69	June 28	Hurons.	London.	928				427		22 09		35				
70	do 29	Mongolian	Liverpool	253				585		20 08		35				
71	do 30	Avlona.	Newcastle.	180				170		6 90						
72	do 30	Nessmore	Liverpool					451		13 53		55				
				14,270		13,043		13,043		560 99		2,443		3,999,452	1,464,421	624
		Reported May 31st, 1895.		4,450	13	15,523	364	15,887	13	521 11		1,997	13	4,442,604	1,520,357	669
		Total to June 30th, 1895.		18,720		29,466	364	29,830		1,062 10		4,440		8,442,056	2,990,778	1,293
		Same period, 1894		16,055		29,090		29,090	19	1,033 03		1,521	3			
		do 1893		218		83,374	15	33,380	31	704 70		572	3			

Horses on "Labrador" for Liverpool.

Record of Live Stock Shipped from Port of Montreal during 1895--Continued.

Number.	Date.	Steamer.	Destination.	SHEEP.		CATTLE.				HORSES.		SWINE.		Grain. for Feed.	Number men.	
				Shipped.	Lost.	Pat.	Stockers.	Total.	Lost.	Shipped.	Lost.	Shipped.	Lost.			
1895.																
111	Aug. 1.	Concordia	Glasgow.	500	0			401	0	17 03						
112	do	Nessmore	Liverpool.					520	0	15 60						
113	Aug. 2.	Memphis.	Bristol.	876	0			286	0	17 61						
114	do	Fremont.	London.	893	4			153	1	13 52	83	0				
											22					
115	Aug. 3.	Mongolian.	Liverpool.	568	0			611	0	24 01	3	0				
116	do	British Empire	London.	276	3			238	0	9 90	36	0				
117	do	Norwegian	Glasgow.					400	0	12 00	40	0				
118	do	Canada.	London.	220	0			4.	0	3 40						
119	do	Crecian	do	1,045	1			288	0	19 09	54	0				
120	do	Lake Ontario.	Liverpool	294	0			520	0	18 54	1	0				
121	Aug. 8	State of Georgia.	Newcastle	433	0			341	0	14 56						
122	do	Amarynthia.	Glasgow.	201	1			403	0	14 10	19	0				
123	do	Lycea	Bristol.	824	8			260	0	16 04						
124	Aug. 9.	Hurona	London.	717	1			130	0	11 07	92	0				
125	do	Numidian	Liverpool.	517	0			580	0	22 57	34	0				
126	do	Scotman.	do	2,640	4			739	0	48 57	27	0				
127	Aug. 11.	Oronmore.	London.					478	0	14 34						
128	do	Siberian.	Glasgow.					440	0	13 20	109	0				
129	do	Brazilian	London.	646	2			297	0	15 37	138	3				
130	Aug. 15.	Warwick.	Glasgow.	531	0			399	0	17 28						
131	do	Parkmore	Liverpool	869	5			720	0	30 29						
132	do	Etolia.	Bristol.	323	3			341	0	13 46	20	0				
133	Aug. 16.	Gerona.	London.	1,547	4			328	0	25 31	90	0				
134	do	Mariposa.	Liverpool	1,784	11			61	0	19 67	32	0				
135	Aug. 20.	Pomeranian.	Glasgow			400		400	0	12 00	90	0				
136	do	Rosarian.	London.	1,196		323		323		21 65	46					
137	do	Avlona.	St. Malo.				281	281		8 43	102					
138	do	Lake Huron.	Liverpool	1,070		505		505		25 85	54					
139	do	Alcides.	Glasgow			400		400		12 00	24					
140	do	Dominion	Bristol.	360		396		396		15 48						
141	do	Hispania.	London.	1,460		251		251		22 13						
142	do	Montezuma	do	1,654		540		549		33 01	128					
143	do	Laurentian.	Liverpool	1,778		648	80	728		29 02	12					

[illegible]

* Per Labrador.

[illegible]

RECORD of Live Stock shipped from Port of Montreal during 1895—Continued.

Number.	Date.	Steamer.	Destination.	SHEEP.		CATTLE.				HORSES.		SWINE.		Hay for Feed.	Grain for feed.	Number of Men.	
				Shipped.	Lost.	Far.	Stockers.	Total.	Lost.	Shipped.	Lost.	Shipped.	Lost.				
1895.																	
179	Sept. 22.	Lake Huron.	Liverpool	1,093		484		484	25 45								
180	do 22.	Durham City.	do			271		271	8 13								
181	do 25.	Pomeranian.	Glasgow	1,407		430		430	26 97	53							
182	do 25.	Norseman.	Liverpool	1,727		602		602	35 33	7							
183	do 25.	Gerona.	Cherbourg			127	451	578	17 34	202							
184	do 26.	Rosarian.	London	1,335		124		124	17 07	205							
185	do 26.	Aleides	Glasgow	505		398		398	16 99	44							
186	do 26.	Dominion.	Bristol	1,659		305		305	25 74	12							
187	do 28.	Canada	London	1,647		230		230	23 37	*206							
188	do 28.	Laurentian.	Liverpool	1,385		500		500	28 85	8							
Shipped in September				39,824		14,509	1,150	15,659	868 01	1,551						781	
Previously reported				72,341	289	59,111	1,105	60,216	94 2,529 89	8,281	36	128				2,748	
Total to date				112,165		73,620	2,255	75,875		9,832		128				3,529	
193	Same date, 1894			90,703	678			60,880	69 3,004 11	3,988							
191	do 1893			905				70,541	115 1,896 13	1,310							
214	do 1892			15,917				86,877	171 1,737 54	1,565							

*On Labrador. †161 more sent to Quebec to go on board there, on account of low water.

189	Oct.	1.	Sarmatian.	Glasgow.	2,248	4	400	0	34	48	18	0					24
190	do	2.	Lake Superior	Liverpool	1,227	0	471	0	26	40	36	0					23
191	do	3.	Tritonia	Glasgow	2,036	3	404	0	32	48	23	0					23
192	do	3.	Nesmore	Liverpool			520	0	15	60							19
193	do	3.	Austrian	London	1,367	6	201	0	19	70	66	1					14
194	do	4.	Memori	Bristol	1,239	2	196	1	18	27	81	0					16
195	do	5.	*Angloman	Liverpool	2,143	10	404	2	33	55							*36
196	do	6.	Buenos Ayres.	Glasgow	1,735	6	350	0	27	85							21
197	do	9.	Lois.	London.	2,107	11	190	0	23	77	246	0					31

198	do	9	Lake Winnipeg.	Liverpool	913	0	404	0	404	0	21 25	29	0	...	...	13
199	do	10	Montazuma	London	3,418	...	630	...	650	...	53 68	83	0	...	...	48
200	do	10	Montevideo	do	2,140	14	211	...	211	...	27 73	41	0	...	...	48
201	do	10	Concordia	Glasgow	338	3	395	...	395	3	15 23	...	...	...	...	17
202	do	11	Memphis	Bristol	3,225	58	216	...	216	...	38 73	33	0	...	...	22
203	do	12	Mongolian	Liverpool	1,168	8	439	...	439	0	24 85	97	3	...	...	22
204	do	15	Escalona	St. Malc.	...	...	277	...	277	0	8 31	106	0	...	...	15
205	do	15	Amaruthia	Glasgow	897	2	395	...	395	2	20 22	6	0	...	...	15
206	do	15	Norwegian.	do	1,780	6	277	...	277	0	26 17	127	0	...	...	19
207	do	16	Lake Ontario.	Liverpool	385	0	228	...	228	0	10 69	81	0	...	...	19
208	do	16	Parkmore	do	969	6	726	...	726	1	31 47	...	...	...	...	12
209	do	16	Precian.	London	1,610	8	185	...	185	0	21 65	89	2	...	...	30
210	do	17	Lycia	Bristol	2,456	33	101	...	101	1	27 59	...	...	...	...	14
211	do	19	Nuntidian	Liverpool	1,077	2	527	...	527	1	26 58	7	0	...	...	14
212	do	19	Scotia	London	1,541	...	183	...	183	...	20 93	...	...	...	...	16
213	Oct.	19	Scotsman	Liverpool	5,346	...	798	...	798	...	77 40	10	...	...	...	54
214	do	19	Assaya.	London	2,242	...	290	...	290	...	31 12	75	...	...	...	25
215	do	22	Siberian	Glasgow	2,652	...	359	...	359	...	37 29	188	...	...	...	25
216	do	22	Lake Huron	Liverpool	1,147	...	363	...	363	...	22 36	111	...	...	...	19
217	do	23	Mentmore	do	313	24	237	...	237	...	10 11	108	...	...	...	20
218	do	24	Warwick.	Glasgow	414	...	298	...	298	...	13 08	...	...	...	...	13
219	do	25	Etolia	Bristol	2,002	...	181	...	181	...	25 45	...	...	...	...	32
220	do	26	Merrimac.	London	2,578	...	460	...	460	...	39 58	75	...	...	...	16
221	do	26	Brazilian.	do	2,362	...	175	...	175	...	28 87	82	...	...	...	32
222	do	27	Hurona.	do	2,228	...	329	...	329	...	32 15	196	...	...	...	17
223	do	29	Pomeranian.	Glasgow	1,685	...	403	...	403	...	28 94	76	...	...	...	23
224	do	31	Aldes.	do	463	...	342	...	342	...	14 89	16	...	...	...	22
Total for Oct., 1895					59,087	...	12,746	...	12,585	...	968 42	2,064	...	5,020,280	1,474,506	778
Reported 30th Sept., 1895.					112,165	524	73,620	2,255	75,875	120 3,397 90	9,832	37	...	23,137,775	7,524,731	3,529
Total to 31st Oct., 1895					171,252	...	85,866	2,504	88,460	...	4,366 32	11,896	...	28,158,055	8,990,237	4,307
229	...	...	Same date, 1894.	...	119,341	894	...	...	79,390	96 3,575 79	5,095	...	...	...	...	...
216	...	...	do 1893.	...	1,781	...	...	...	80,495	141 2,193 51	1,516	...	...	...	...	...
243	...	...	do 1892.	...	15,914	...	...	...	95,192	608 1,903 84	1,628	...	...	...	...	...

*283 cattle, 687 sheep to go on at Quebec.

[illegible]

RECORD of Live Stock shipped from Port of Montreal during 1895—Continued.

Number.	Date.	Steamer.	Destination.	SHEEP.		CATTLE.			Fees Collected. \$ cts.	HORSES.		SWINE.		Grain for feed. Lbs.	Number of Men.
				Shipped.	Lost.	Pat.	Stockers.	Total.		Shipped.	Lost.	Shipped.	Lost.		
223	Nov. 8.	Christiania	London.	1,974					19 74						8
234	do 9.	Gerona	do	2,157				317	31 08	44					22
235	do 10.	Austrian.	Glasgow.	1,299				150	16 59	48					11
236	do 12.	Hibernian.	Bristol.	1,310				243	20 39	20					16
237	do 12.	Menon.	Glasgow.	2,674					26 74	71					16
238	do 14.	Concordia	Glasgow.	306				108	9 00						9
239	do 14.	Lake Winnipeg.	Liverpool.	924				373	20 61	90					19
240	do 15.	Scotsman	do	4,308				940	71 28	30					55
241	do 15.	Fremona	London.	2,067				283	29 16						21
242	do 16.	Mongolian.	Liverpool.	1,084				473	25 03	7					24
243	do 19.	Norwegian.	Glasgow.	1,576				258	23 50	98					17
244	do 20.	Lake Ontario.	Liverpool.	304				192	7 30	150					7
245	do 20.	Memphis.	Bristol.	5,672				20	37 32	78					20
246	do 20.	Amartythia	Glasgow.	1,494				257	22 65	41					16
247	do 21.	Iona.	London.	2,734				160	32 14	177					18
248	do 21.	Montevideo.	do	2,110				73	23 20						13
249	do 21.	Lake Huron.	Liverpool.	1,165		124		124	15 37	195					11
November total				30,355		6,512		6,512	588 91	1,307				3,436,675	502
Previously reported				171,252	839	85,866	2,504	88,400	133 4,366 32	11,896		128		28,158,055	4,307
Total for 1895.				210,607	839	92,478	2,504	94,972	133 4,955 23	13,203		128		31,594,730	4,809
Total for 1894.				189,780				86,635	473 3,997 53	5,623					
do 1893.				3,743				83,322	141 2,297 94	1,660		137			
do 1892.				15,914				98,731	646 1,984 70	1,739		1,262			

*On Laurentian, that had cattle (562), &c., sheep (1,914), shipped by rail and put on board at Quebec on account of low water. †262 more cattle sent by rail to Quebec. ‡Lost off Scotch coast. On Vancouver.

There was shipped by rail from here and put on board at Quebec :—

Nov. 3..	Laurentian	1,914	.....	.....	562
do 3..	Anglonian	3,137	.....	.....	216
do 3..	Sarmatian .....	.....	.....	.....	262
Oct. 3..	Anglonian	689	.....	.....	283
June 3..	Cynthiana	1,801	.....	.....	78
		7,541	.....	.....	1,401

GEORGE POPE,
E. B. MORGAN,
Inspectors.

MONTREAL, 25th November, 1895.

Total Record of Live Stock Shipments from the Dominion for the year 1895 :

Cattle	104,872
Horses	13,203
Sheep	210,607

APPENDIX No. 7.

STATEMENT relating to the Wharfs under the control of the Department on 30th June, 1895.

(Rules established for the government of wharfs, 12th June, 1889.)

Locality.	Wharfinger.	Date of Appointment of Wharfinger.	Remuneration Allowed.	Amount deposited to credit of Receiver General.
ONTARIO.				\$ cts.
Cockburn Island	Alfred Monck	Apl. 16, 1894.	25 p. c. of collections	80 85
Goderich	Wm. Marlton	Feb. 14, 1894.	25 do not to exceed \$200 per annum.	260 43
Kingsville	S. A. King	May 5, 1890.	25 p. c. of collections	71 21
Morpeth	Chas. Stammers	Aug. 1, 1894.	25 do	46 73
Rondeau	W. R. Fellowes	Dec. 17, 1888.	25 do	92 35
Sault Ste. Marie	Vacant	Jan. 2, 1890.	\$100 per annum.	368 90
Southampton	James Johns	Oct. 31, 1892.	25 p. c. of collections	75 67
Summerstown	H. Haggarty	Sept. 27, 1894.	25 do	16 01
Warton	H. R. A. Ely	Dec. 10, 1890.	25 do	165 48
QUEBEC.				
Agnes	L. A. Roy	Nov. 27, 1891.	25 p. c. of collections	
Anne St. Jean	J. Desgagné	June 10, 1893.	25 do	4 55
Bas St. Paul	Vacant	Aug. 25, 1891.	25 do	
Bas St. Paul, Isolated Blk	A. Simard	Aug. 25, 1891.	25 do	139 39
Beauport	Felix Guillot	Nov. 21, 1891.	25 do	
Berthier	Vacant		25 do	85 34
Carleton	Jos. Cauchon	June 4, 1889.	\$50 per annum.	33 74
Cascades	Nérée Moreau	Oct. 26, 1892.	25 p. c. of collections	
Chicoutimi	Juste Ouellette	May 2, 1892.	25 do	150 00
Echo Vale, Lake Megantic	D. P. Matheson	May 16, 1894.	25 do	
Grand River	John Carberry	Sept. 23, 1892.	55 do	192 44
Isle aux Grues	Jos. Painchaud	Feb. 17, 1890.	25 do	3 22
Lacolle	R. J. Robinson	Mar. 8, 1894.	25 do	2 89
Les Eboulements	M. Tremblay	Sept. 4, 1894.	25 do	108 26
L'Islet	Octave Morin	Feb. 8, 1892.	25 do	3 99
Longueuil	D. Brissette	Mar. 23, 1893.	25 do	89 71
Megantic	D. J. Matheson	May 16, 1894.	25 do	
Murray Bay	Elic Maltais	Aug. 15, 1893.	25 do	191 02
New Carlisle	John C. Hall	June 4, 1889.	25 do	192 35
Perce	T. W. Flynn	Jan. 19, 1893.	25 do	77 64
Port Daniel	John Enright	Sept. 11, 1890.	\$50 per annum.	56 00
Rimouski	Chas. Lepage	July 24, 1894.	25 p. c. of collections	
Rivière Ouelle	J. H. dit Beaulieu	Nov. 28, 1892.	25 do	2 55
Rivière du Loup	Louis Pinze	Sept. 16, 1891.	25 do	403 64
St. Alphonse de Bagotville	Abel Tremblay	July 7, 1891.	25 do	183 74
St. Jean d'Orléans	Chas. Langlois	Dec. 16, 1892.	25 do	
St. Laurent d'Orléans	Edouard Chabot	Dec. 16, 1892.	25 do	16 33
Ste. Cécile du Bic	L. N. Côté	July 20, 1891.	25 do	2 29
Tadoussac	A. Christiansen	July 7, 1891.	25 do	25 85
Trois Pistoles	Nap. Rioux	Sept. 16, 1891.	25 do	
St. Thomas de Montmagny	T. Gandrew	Nov. 9, 1894.	25 do	5 70
NOVA SCOTIA.				
Arisaig	John McInnis	Aug. 97, 1894.	25 do	37 00
Avonport	Robert Shaw	Nov. 23, 1888.	25 do	
Barrington	S. W. Crowell	Aug. 12, 1891.	25 do	167 27
Bayfield	Wm. McDonald	Oct. 30, 1894.	25 do	57 57

STATEMENT relating to Wharfs, &c.—Continued.

Locality.	Wharfinger.	Date of Appointment of Wharfinger.	Remuneration Allowed.	Amount deposited to credit of Receiver General.
NOVA SCOTIA—Con.				\$ cts.
Belliveau's Cove	St. Clair Thériau.	Nov. 24, 1892	25 p. c. of collections	244 85
Broad Cove, Lunenburg Co.	John Teal	June 12, 1893	25 do	
Broad Cove Marsh, Inverness Co.	Hugh McDonald	Oct. 19, 1892	25 do	
Brooklyn	F. T. Gardiner	Oct. 20, 1882	20 do	
Canada Creek	C. E. Eaton	Nov. 23, 1888	25 do	
Cape Cove, Cape St. Mary's	M. A. Doucette	Dec. 7, 1891	25 do	40 42
Centreville	W. M. B. Dakin	Aug. 25, 1888	25 do	96 44
Chipman's Brook	Jas. Misaner	Nov. 23, 1888	25 do	
Church Point	Chas. F. Belliveau	Aug. 20, 1892	25 do	60 95
Cow Bay	Arch. McKinnon	April 15, 1879	7½ do	1,347 28
Cranberry Head	Abram Thurston	Feb. 16, 1889	25 do	
Delap's Cove	R. W. McCaul	Nov. 28, 1889	25 do	
Digby	H. B. Short	Jan. 9, 1891	25 do	557 51
Eagle Head	Nathan Leslie	do 9, 1889	25 do	
East Bay	Donald McInnis, (Ronald's son)	April 5, 1886	50 do	
East River, Sheet Harbour	Malcolm McFarlane	May 20, 1890	25 do	6 08
Grand Narrows, Victoria Co.	Vacant	Aug. 25, 1888	25 do	
Grand Narrows, Cape Breton Co.	E. A. McNeill	Nov. 6, 1888	25 do	180 48
Hall's Harbour	Sydney Roscoe	do 23, 1888	25 do	
Hampton	Judson Foster	Aug. 25, 1888	25 do	18 16
Harbourville	B. Morris	June 8, 1894	25 do	28 76
Irish Cove	John Cash	Sept. 17, 1892	25 do	37 90
Maitland, Hants Co.	W. B. Smith	June 8, 1894	25 do	48 56
Maitland, Yarmouth Co.	J. N. Sanders	Sept. 20, 1894	25 do	34 22
Margaretsville	T. J. Downie	Aug. 25, 1888	26 do	80 32
Meteghan Cove	H. F. Deveau	Sept. 15, 1888	25 do	69 17
Meteghan River	Urbain Doucette	Jan. 3, 1883	20 do	101 33
Militia Point	D. McIntosh	Aug. 20, 1892	25 do	
Morden	John Redgate	Nov. 16, 1893	25 do	59 06
Oak Point (Kingsport)				200 00
Ogilvie	Martin Donnellan	July 13, 1893	25 p. c. of collections	17 77
Parrsboro'	Thompson Tipping	Nov. 26, 1888	25 do	50 22
Pickett's Wharf	Andrew Bishop	Dec. 24, 1884	25 do	
Plymton	Wm. K. Smith	Aug. 8, 1890	25 do	
Point Brûlé	David Stevenson	Nov. 23, 1888	25 do	
Port George	W. Crawford	June 7, 1891	25 do	99 01
Port Hood	V. A. McDougald	May 17, 1892	25 do	122 83
Port Lorne	Samuel Beardsley	Aug. 25, 1888	25 do	118 32
Salmon River	J. M. Deveau	Nov. 25, 1890	25 do	
Saulniersville	John T. Saulnier	Aug. 25, 1888	25 do	69 03
Tancook Island	Amos Hubley	Feb. 28, 1893	25 do	
Tracadie	J. M. Hall	Nov. 6, 1888	25 do	
Tusket Wedge	Jas. Cothreau	Feb. 16, 1889	25 do	
Victoria	William Brown	do 11, 1889	25 do	12 40
Wallace	Don McKenzie	Dec. 16, 1892	25 do	
West Pubnico	Wm. D'Entremont	Sept. 21, 1893	25 do	11 50
West River, Sheet Harbour	Malcolm McFarlane	do 3, 1889	25 do	
White Point	Elisha West	Jan. 9, 1889	25 do	
NEW BRUNSWICK.				
Buctouche	J. J. LeBlanc	May 2, 1892	25 do	10 49
Campbellton	Alfred J. Venner	June 10, 1893	25 do	107 11
Cape Tormentine	Wm. B. Welsh	April 28, 1894	25 do	420 69
Clifton, Stonehaven	S. Paynes	Nov. 9, 1894	25 do	2 32
Dalhousie	W. J. Smith	June 27, 1891	25 do	204 70
Hopewell Cape	Wm. Hamilton	April 9, 1890	25 do	35 40
Quaco	W. H. Rourke	July 15, 1892	25 do	
St. Louis	E. Comeau	May 2, 1893	25 do	

STATEMENT relating to Wharfs, &c.—*Concluded.*

Locality.	Wharfinger.	Date of Appointment of Wharfinger.	Remuneration Allowed.	Amount deposited to credit of Receiver General.
PRINCE EDWARD ISLAND.				\$ cts.
Annandale.....	James Taylor.....	July 2, 1885	25 p. c. of collections.....	59 46
Bay View.....	Joseph Harrington.....	Oct. 2, 1885	25 do.....	16 57
Belfast.....	Thos. McLennan.....	July 21, 1890	25 do.....	84 51
Brush Wharf.....	Levi R. Ings.....	Sept. 18, 1885	25 do.....	108 22
Campbell's Cove.....	Angus McIntyre.....	Oct. 17, 1888	25 do.....	
Chapel Point.....	Ronald McCormack.....	Sept. 18, 1885	25 do.....	8 70
China Point.....	W. S. N. Crane.....	do 18, 1885	25 do.....	16 50
Clifton.....	Wm. McKay.....	do 22, 1886	25 do.....	
Crapaud and Victoria Pier.	James Day.....	May 12, 1890	25 do.....	94 62
Georgetown.....	James Bourke.....	July 2, 1885	25 do.....	29 24
Hickey's Wharf.....	R. Webster.....	do 31, 1891	25 do.....	14 00
Higgin's Shore.....	G. G. Henry.....	Nov. 9, 1891	25 do.....	1 02
Hurd's Point.....	R. Robblee.....	Oct. 6, 1888	25 do.....	34 08
Kier's Shore.....	W. Hodgson.....	June 10, 1895	25 do.....	72 88
Lambert.....	Angus McQueen.....	Oct. 24, 1896	25 do.....	
Lewis Point.....	D. Lewis.....	June 10, 1895	25 do.....	77 65
McGee's Island.....	Norman Gallant.....	Nov. 9, 1891	25 do.....	
Mink River.....	B. Clow.....	June 30, 1891	25 do.....	
Murray Harbour, South.....	R. Murley.....	Aug. 25, 1891	25 do.....	10 00
Nine Mile Creek.....	Edward Harrington.....	Oct. 29, 1885	25 do.....	
North Cardigan.....	Donald McIntyre.....	July 2, 1885	25 do.....	28 38
Pinette.....	Vacant.....		25 do.....	
Pownal.....	Alex. McRae.....	Oct. 2, 1885	25 do.....	52 11
St. Mary's Bay.....	B. Lewellin.....	April 22, 1893	25 do.....	25 64
Souris.....	Vacant.....		25 do.....	
South Rustico, Oyster Bed				
Bridge.....	D. Gallant.....	Feb. 23, 1895	25 do.....	
Stevens and Montague.....	Angus McQueen.....	Oct. 24, 1891	25 do.....	86 75
Sturgeon River.....	Bernard Kearney.....	Sept. 18, 1885	25 do.....	32 76
Tignish River.....	Geo. Conroy.....	Oct. 2, 1891	25 do.....	49 81
Vernon River.....	J. G. McKenzie.....	do 19, 1885	25 do.....	100 88
Wood Island.....	M. H. McMillan.....	May 16, 1889	25 do.....	

RECAPITULATION.

Ontario.....	\$ 1,177 64
Quebec.....	1,971 24
Nova Scotia.....	3,974 41
New Brunswick.....	780 71
Prince Edward Island.....	1,003 78
Total wharfage dues collected.....	\$ 8,907 78

ADD—Fees received by undermentioned harbour masters in excess of remuneration allowed:—

Harbour Masters—Fort William, Ont.....	\$ 45 50
do Port Arthur, Ont.....	26 50
do St. John, Que.....	88 50
do Cape Canso, N.S.....	15 00
do Chatham, N.B.....	64 50
do St. Andrews, N.B.....	3 00
	243 00
Total Revenue from Wharfs and Harbours.....	\$ 9,150 78

This statement only shows amounts received by department and placed to credit of Receiver General up to 30th June, 1895.

APPENDIX No. 8

SIGNAL SERVICE, CANADA.

QUEBEC, 11th November, 1895.

To the Deputy Minister of
Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit the following report as to the service for the year ending 30th June, 1895.

As in preceding seasons reports have been received from the stations in the lower part of the river and gulf, recording the weather, wind, condition, location and movement of the ice during the winter and spring months, and during the season of navigation, all inward and outward vessels as signalled and seen from the stations.

Snow fell early, but not in such quantities as in 1893-94, but ice formed early and closed the river harbours that in 1892-93 remained open much later.

As compared to previous seasons very little ice was met by incoming steamers and very little detention was caused by it. Most of the vessels met the first ice from between 30 to 40 miles to the eastward of Cape Ray and some 35 miles to the westward, and very little up to Anticosti and none from there to Quebec.

A few steamers who made a more southerly course found field ice within 40 miles to the east, north and west of Bird Rocks.

The port of Canso was closed on the 21st January and opened on the 19th April. In 1893-94 the port was closed on 9th January and opened 25th April.

Sidney Harbour closed 13th February and opened on 15th April. In 1893-94 the closing was on the 2nd February and the opening on the 28th April.

Port Mulgrave, Gut of Canso, reported the condition of ice in the Gut as in the past two seasons to Halifax, N. S., Pictou, N. S. and Charlottetown, P. E. I. until navigation was closed.

Grosse Isle Quarantine station reported as in 1892 all trans-atlantic vessels when given pratique, and has proved very satisfactory to the shipping interests. These reports are free to the department being transmitted over the government telegraph line to Quebec.

From the 1st to the 20th April three reports per week were obtained and forwarded to the Boards of Trade, Montreal, St. John, N.B. and Quebec, and to the Chamber of Commerce, Halifax, N.S.; also to the press of Montreal and Quebec, to the agent of the department, Quebec, to the custom house and immigration agent, to agents of steamship lines, tug owners, to the pilots for below and above Quebec, also to Messrs. H. Fry & Co., Lloyds agents, Quebec.

From the 21st April reports were received daily as above and in addition the news room, North Sidney, is also supplied with the reports during the season of navigation.

The quarantine doctor at Rimouski is also supplied with a report of the incoming mail steamers, name of station and hour of passing being given when vessel first signalled.

The chief superintendent of the quarantine service at Grosse Isle is also supplied with full information as to weather, wind and the incoming of all trans-atlantic or foreign vessels.

Information as to the wind, weather and ice in the vicinity of Anticosti, Magdale Islands, Meat Cove, C. B., St. Paul's Island, Cape Ray, Newfoundland, is also sent to Pointe aux Esquimaux in March for the guidance of the sealing fleet.

This is the fifth season that no ice has been seen in the vicinity of St. Pierre-Miquelon after the middle of April.

Full information was supplied from the bureau here as in past seasons to the agents at Anticosti, Magdalen Islands, Meat Cove, C. B., Cape Ray, Newfoundland; Low Point, North Sydney, from the 18th April and to Cape Race, Newfoundland; from the 13th April, as to the weather, wind, movement and condition of the ice in the Gulf and River St. Lawrence up to Montreal for the guidance of any vessel calling for information.

NAVIGATION.

1894—Last outward sailing vessel, October 31st, barque "Festine Lents."

1894—Last outward steamers, December 5th, ss. "Hestia" and "Rosarian."

1895—Last outward steamers, April 20th, ss. "Otter" and ss. "Polino."

1895—First inward steamer bound trans-atlantic vessel, April 26th, ss. "Mariposa," from Liverpool, and ss. "Astria," from Palermo on the 28th April. The Allan liner "Sardinian," from Liverpool, April 18th, arrived on the 30th April.

The first inward bound sailing vessel arrived on May 12th, from Liverpool, the barque "Prince Charlie."

SEALING.

March 25th. The following eleven schooners with an average crew of ten men each left Point aux Esquimaux for the gulf and Straits of Belle Isle, and returned having made but very poor fares: "Eugenie," "Emilia," "Stella Maria," "Gleaner," "Pioneer," "C.M.G.P.," "Marguerite," "Marie Anne," "Sea Star," "Marie Sacré-Cœur," "Marina."

In 1894, fourteen schooners left Pointe aux Esquimaux on March 13th, twelve days earlier than this season, which in part explains the poor catch.

Respectfully submitted,

H. J. McHUGH,
Supt. Signal Service.

APPENDIX A.

REPORT on ice, &c., in the Straits of Belle Isle and west coast of Newfoundland as noted by the Agents of the Department at Belle Isle, Cape Bauld, Cape Norman, Forteau, Greenly Island and Point Rich, Newfoundland, from July, 1894, to June, 1895.

BELLE ISLE.

1894, December 1st.—First snowfall, had occasional snow flurries during the month, prevailing winds being from the west and west north-west.

1894, December 23rd.—First slob ice drifted out from the north. In 1893, slob ice noticed on December 3rd, and in 1892 on December 23rd.

1894, December, 31st.—One large berg aground three miles off to S.S.E.

1895, January—On the 10th, 11th and 14th, slob ice made very fast but drifted off, none being seen from the 23rd to 31st. Fog occurred on the 15th and 16th, only on the 20th the iceberg to the S.S.E., moved off south.

February—The prevailing winds were from the W. and W.N.W., and W.S.W. Very little snow fell, occurring on the 1st, 3rd, 5th, and 12th. Fog and rain on the 28th. The first heavy ice came in on the 8th. Up to this date vessels could have passed through. On the 13th a large number of ducks and other sea birds made their appearance around the island. As a rule very few birds are to be seen in this month.

March.—Snow fell on the 5th and 9th only,—rain and fog on the 1st. A heavy am of ice on the 3rd and 4th, and very little during the rest of the month. On the

20th a steamer and schooner seen off Cape Norman. On the 23rd a schooner off Cape Bauld,—on the 29th and 30th two schooners going west.

April.—Snow fell on the 1st and 11th. No fog during this month—heavy gales from the west and north, from the 1st to 3rd,—very little ice to the east or south, heavy jam coming down from Cape Norman. On the 9th strings of ice in the straits,—Schooners "Fidèle" and "Five Brothers" off Cape Bauld. On the 12th the "Fidèle" landed fishing crew here. From the 14th to 20th straits full of ice, north north-east winds, then west winds set in to the end of the month. Moving ice eastwards three knots. On the 25th edge of the ice passing here at 10 a.m., schooners "Bessie Elliott" and "Five Brothers" drifting in the jam. No ice seen after the 28th.

May.—No snow fell this month. Rain and fog on the 6th and 14th. No heavy jams of ice occurred this month, none to the west, but a good deal to the south-east, moving from the north-east on the 18th. West north-west gale moved the ice to the east fast, and on the 19th the straits were clear until the end of the month. On the 23rd schooners "Fidèle" and "Beulah" passed, bound for Lark Harbour.

June.—On the 3rd a string of ice coming out from the north-east, along the Labrador shore. On the 7th, light scattered ice to the east and south. 80 schooners bound north and west. Nothing to impede navigation. On the 17th a two-masted steamer passed in at 1 a.m., first of the season. On the 22nd, 4 p.m., the ss. "Elenore," passed in, at 6.00 p.m.; the "Sarmatian" passed out. Some scattered ice to the west.

ICEBERGS.

December 31st, 1, to S. S. E.	February 17th, 41, to S.
January 30th, 1, to E.	May 1st, 16, to S. E.
February 13th, 30, to E.	do 17th, 16, to do
do 14th, 3, to W.	do 19th, 9, to do
do 14th, 34, to E. and S.	do 27th, 7, to do

CAPE BAULD, NEWFOUNDLAND.

As stated in the previous reports, the distance from Belle Isle being but 14 miles, the observations as to wind and ice vary but little.

No seals sighted on shore or drifting ice.

CAPE NORMAN, NFLD.

1894.—October 2nd.—First snow, E.N.E. wind.

November.—Snow fell during 14 days of this month.

December.—First ice on the 5th in the inshore, to end of month moving east. Snow fell on 11 days.

January.—From 1st to the 9th no ice in sight, but from the 10th to the end of April, the straits were covered with heavy, close-packed ice inshore, moving east. During this interval it snowed 53 days. From the 16th to 20th May, and 5th to 8th and 16th to 20th June, heavy close packed inshore. On all other dates from 1st May to 30th June, open ice inshore. Snow fell on two days in May and June. No seals sighted.

ICEBERGS.

1894.—October.—Two seen (daily average.)

" —November.—Three seen (only.)

" —December.—Six seen "

1895.—February.—Five seen "

" —March.—One seen (daily average.)

" —April.—Two seen "

" —May.—Four seen "

" —June.—Nineteen seen (only.)

POINT AMOUR, LABRADOR.

Observations as to wind and weather are almost similar to Cape Norman, as both are within the same limit of the strait. The first snow this season fell on the 6th November, and first slob ice on the 20th. On the 18th January, the mail man from the north reported plenty of seals caught in the bays.

March 19th.—Sealing steamer going north.

April 10th.—One steamer and nine schooners in ice after seals.

May 16th to 20th.—Ducks and partridge in thousands.

May 22nd.—Ninety seals caught in harbour.

June 3rd.—First codfish caught.

June 21st.—Fishermen had to pull up nets on account of ice.

June 22nd.—First inward bound steamer sighted. Deer and caribou very plentiful.

GREENLY ISLAND.

1894.—First snow fell on November 4th, and first ice formed on December 11th, and from that until end of April, heavy to close packed ice covered the entrance to the straits. First seals on ice March 2nd.

ICEBERGS.

1894.—October.—Three seen.

POINT RICH, NEWFOUNDLAND.

1894.—First snow, September 3rd.

1895.—First ice seen outside on the 7th January, and the first shore ice formed on the 31st January. From this latter date until the 17th April, heavy, close packed ice kept along shore and outside. The seal fishery was very good.

March 13.—Seals plentiful.

March 16.—Sealing steamship just outside.

March 18.—Sealing steamer came ashore near here and has been abandoned by crew.

March 22.—Steamer outside.

March 31.—A schooner outside loaded with seals.

April 2.—One steamer and four schooners far off, killing seals.

April 7.—Six schooners in ice, killing seals.

April 14.—Another schooner with 60 seals jammed ashore at the point; crew came ashore and abandoned the vessel.

ICEBERGS.

1894.—September 3.—Three off here.

1895.—February—Two off here.

“ —April 6.—Two off here.

“ —April 14th.—One off here.

BIRD ROCKS.

1894.—First appearance of light open ice going west was on the 8th November; the winds were variable up to end of month, but ice was seen daily. In December it moved to the south and east; in January in various directions, the winds being variable; in February it moved principally to the west. The first heavy close packed ice appeared on the 5th March, close to the island, and as far as could be seen.

On the 22nd March the steamers “Panther” and “Windsor Lake,” and one schooner in sight.

On the 28th, eight Magdalen Island schooners in sight.

April 1.—One and the only flock of harp seals in sight off here. From the 3rd to the 6th the north edge of the ice in sight.

April 31.—Last of the ice seen.

Respectfully submitted,

H. J. McHUGH,
Supt. Signal Service.

APPENDIX B.

THERMOMETER Readings at Belle Isle from 1st January, 1895, to 31st May.

Date.	Degrees	Date.	Degrees	Date.	Degrees	Date.	Degrees
1895.		1895.		1895.		1895.	
Jan. 1.....	39	Feb. 8.....	30	Mar. 18.....	18	April 25.....	36
do 2.....	33	do 9.....	30	do 19.....	17	do 26.....	34
do 3.....	27	do 10.....	32	do 20.....	26	do 27.....	30
do 4.....	29	do 11.....	30	do 21.....	26	do 28.....	35
do 5.....	— 5	do 12.....	26	do 22.....	20	do 29.....	33
do 6.....	5	do 13.....	24	do 23.....	24	do 30.....	30
do 7.....	9	do 14.....	6	do 24.....	22	May 1.....	20
do 8.....	26	do 15.....	10	do 25.....	26	do 2.....	24
do 9.....	30	do 16.....	6	do 26.....	26	do 3.....	29
do 10.....	34	do 17.....	28	do 27.....	32	do 4.....	29
do 11.....	4	do 18.....	13	do 28.....	33	do 5.....	31
do 12.....	7	do 19.....	31	do 29.....	31	do 6.....	37
do 13.....	12	do 20.....	29	do 30.....	28	do 7.....	39
do 14.....	18	do 21.....	24	do 31.....	26	do 8.....	37
do 15.....	24	do 22.....	26	April 1.....	33	do 9.....	39
do 16.....	22	do 23.....	21	do 2.....	30	do 10.....	39
do 17.....	30	do 24.....	26	do 3.....	30	do 11.....	37
do 18.....	24	do 25.....	28	do 4.....	33	do 12.....	36
do 19.....	18	do 26.....	22	do 5.....	33	do 13.....	37
do 20.....	17	do 27.....	14	do 6.....	30	do 14.....	40
do 21.....	26	do 28.....	33	do 7.....	30	do 15.....	36
do 22.....	20	Mar. 1.....	39	do 8.....	29	do 16.....	36
do 23.....	24	do 2.....	33	do 9.....	33	do 17.....	37
do 24.....	22	do 3.....	27	do 10.....	36	do 18.....	39
do 25.....	26	do 4.....	29	do 11.....	30	do 19.....	40
do 26.....	26	do 5.....	5	do 12.....	19	do 20.....	38
do 27.....	30	do 6.....	— 5	do 13.....	21	do 21.....	41
do 28.....	33	do 7.....	9	do 14.....	32	do 22.....	40
do 29.....	31	do 8.....	26	do 15.....	36	do 23.....	40
do 30.....	28	do 9.....	30	do 16.....	36	do 24.....	40
do 31.....	26	do 10.....	34	do 17.....	37	do 25.....	40
Feb. 1.....	6	do 11.....	4	do 18.....	34	do 26.....	40
do 2.....	21	do 12.....	7	do 19.....	34	do 27.....	39
do 3.....	— 2	do 13.....	12	do 20.....	36	do 28.....	44
do 4.....	— 7	do 14.....	18	do 21.....	36	do 29.....	46
do 5.....	26	do 15.....	24	do 22.....	36	do 30.....	44
do 6.....	26	do 16.....	30	do 23.....	34	do 31.....	45
do 7.....	31	do 17.....	25	do 24.....	36		

Lowest temperature, 1895, 5th January; highest, 1st January. Lowest temperature, 3rd February highest, 28th February. Lowest temperature, 6th March; highest, 1st March. Lowest temperature, 19th April; highest, 17th April. Lowest temperature, 1st May; highest, 29th May.
The sign minus (—) before figures denotes below zero.

(Signed)

MICHAEL COLTON,
Light-Keeper.

Respectfully submitted.

H. J. McHUGH,
Supt. Signal Service.

APPENDIX
TELEGRAPH, SEMAPHORE AND SIGNAL
RIVER AND GULF
SOUTH SHORE OF THE

Signal Stations.	Telegraph Offices.	Lighthouse.	Flag Stations.	Semaphore Station.	Marine Miles from Quebec.	Telegraph Co. Working Lines.
1 L'Islet	Tel. Office		Flag..		41	Great North-western Co.
2 Rivière du Loup.....	do	Lighthouse...	do ..		95	do ..
3 Father Point	do	do ..	do ..		157	do ..
4 Little Métis..	do	do ..	do ..		197	do ..
5 Matane.....	do	do ..	do ..			do ..
6 Cape Chatte	do	do ..	do ..		230	do ..
7 Martin River	do	do ..	do ..		255	do ..
8 Cape Magdalen...	do	do ..	do ..		288	do ..
9 Fame Point.....	do	do ..	do ..		318	do ..
10 Cape Rosier.....	do	do ..	do ..		339	do ..

NORTH SHORE OF THE

11 Port Neuf.....	Tel. Office	Lighthouse...	Flag..		145	Dom. Govt. and G.N.W. Co.
12 Manicouagan	do		do ..		187	do .. do ..
13 Pointe des Monts	do	Lighthouse...	do ..		224	do .. do ..

GASPE COAST

14 Cape Despair.....	Tel. Office	Lighthouse...	Flag..		372	Great North-western Co.
15 Pointe Maquerceau ...	do	do ..	do ..		394	do ..

COAST OF NEW

16 Point Escuminac. ...	Tel. Office	Lighthouse...	Flag..		450	Dom. Govt. and G.N.W. Co.
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ISLAND OF

17 West Point	Tel. Office	Lighthouse...	Flag..		328	Dom. Govt. and G.N.W. Co.
18 South-west Point.....	do	do ..	do ..		358	do .. do ..
19 South Point	do	do ..	do ..		408	do .. do ..
20 Heath Point.....	do	do ..	do ..		428	do .. do ..

MAGDALEN

21 Grosse Isle.....	Tel. Office	Lighthouse...	Flag..		467	D. Govt., W. U. & G.N.W. Co.
22 Amherst Island	do	do ..	do ..		471	do .. do ..

CAPE BRETON,

23 Meat Cove.....	Tel. Office	Lighthouse...	Flag..		529	D. Govt., W. U. & G.N.W. Co.
24 Low Point	do	do ..	do ..	Semaphore..	575	do .. do ..

ST. PAULS

25 Main Station	Telephone	Lighthouse...	Flag..		528	D. Govt., W. U. & G.N.W. Co.
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NEWFOU

26 Cape Ray.....	Tel. Office	Lighthouse...	Flag..		542	D. Govt., Anglo-Amer. Cable Co., W. U. & G.N.W. Co.
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C.

STATIONS, MARINE DEPARTMENT, CANADA.

OF ST. LAWRENCE.

RIVER ST. LAWRENCE.

Rate per ten words and additional words.	Date when established.	Name of Agent.	Post Office.	County.	Province.	Salary per annum from Marine Dept.
25c. & 1c.	Oct. 28, '79.	Mrs. J. B. E. Fortin	L'Islet.	L'Islet	Que.	\$50
do	Nov. 16, '81.	L. T. Puize	Rivière du Loup (en bas).	Temiscouata	do	50
do	Nov. 22, '79.	John McWilliams	Father Point.	Rimouski	do	50
do	Nov. 17, '79.	Jules Martin	Little Métis	do	do	50
do	Nov. 5, '79.	P. Desjardins	Matane	do	do	50
do	Sept. 19, '79.	Treflé Côté.	Cape Chatte.	Gaspé	do	50
do	Sept. 23, '79.	Jean Gauthier	Martin River.	do	do	50
do	Oct. 9, '79.	J. F. Sasseville.	Cape Magdalen.	do	do	50
do	Oct. 14, '80.	James Ascah	Fox River.	do	do	50
do	Oct. 20, '79.	E. Costin	Cape Rosier.	do	do	50

RIVER ST. LAWRENCE.

40c. & 2c.	June 1, '83.	Dorelas Tremblay	Port Neuf (en bas)	Saguenay	Que.	\$50
do	Aug. 15, '83.	A. Lausier	Manicouagan	do	do	
do	Oct. 19, '83.	V. Faffard	Pointe des Monts.	do	do	50

OF THE GULF.

25c. & 1c.	June 17, '80.	James Beck	Cape Despair	Gaspé	Que.	\$50
do	May 22, '80.	Auguste Bertrand	Port Daniel.	do	do	50

BRUNSWICK.

40c. & 2c.	July 2, '85.	K. McLennan	Point Escuminac	Northumberland	N.B.	
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ANTICOSTI.

75c. & 6c.	Oct. 1, '81.	Auguste Malouin	Anticosti Id. via Gaspé.	Gaspé	Que.	
do	Oct. 18, '80.	E. Pope	do	do	do	
do	July 27, '81.	Alphonse Nadeau	do	do	do	
do	July 20, '81.	Z. Gagné	do	do	do	

ISLANDS.

\$1.00 & 8c.	Aug. 17, '80.	A. Le Bourdais	Magdalen Id. via Pictou.	Gaspé	Que.	
do	June 11, '81.	William Cormier	do N.S.	do	do	

NOVA SCOTIA.

55c. & 3c.	Nov. 7, '81.	A. R. MacDonald	Meat Cove, C.B.	Victoria	N.S.	
30c. & 2c.	Aug. 1, '81.	J. G. Peters	Low Point, C.B.	Inverness	do	\$50

ISLAND:

80c. & 5c.	1890.	S. C. Campbell	North Sydney, C.B.	Victoria	N.S.	
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NDLAND.

\$1.05 & 10c.	Nov. 3, '82.	E. R. Rennie	Cape Ray.	Newfoundland	Nfld.	\$50
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APPENDIX No. 9.

MESSENGER PIGEONS.

HALIFAX, N. S., MESSENGER PIGEON SERVICE.

From CAPTAIN H. V. KENT, Royal Engineers,
Superintendent of Signals,
Halifax, Nova Scotia.

To J. PARSONS, Esq.,
Agent, Marine and Fisheries Department,
Halifax, Nova Scotia.

CITADEL SIGNAL STATION, HALIFAX, N.S., 1st October, 1895.

SIR,—In reply to your letter dated the 20th ult., asking for a report on the messenger pigeon service for this year, I have now the honour to report as follows:—

On the 1st January, 1895, there were 79 birds in the loft at the Citadel. Since that date 129 have been hatched, and 22 presented by General Cameron, making a total of 230 birds dealt with during this year's training. These are now accounted for as follows, viz.:—

Lost in training from 40 miles and under	72
“ “ “ 70 “ “	1
“ “ “ 90 “ “	1
“ “ “ 120 “ “	7
“ “ “ 160 “ “	2
“ “ Sable Island	26
Missing or escaped from loft	6
Killed by caretaker, through sickness	5
Died	49
Total	169

Leaving 61 birds at present in the loft.

In the training, 152 birds were dealt with. They made 1,207 flights between them, being an average of 8 flights per bird, at distances varying from $\frac{1}{4}$ mile to Sable Island.

On the 6th July last, Pte. Tansey proceeded in the Dominion Government steamer “Newfield” in charge of 12 birds to be let fly from Sable Island. Of the first 6 let go, 5 returned in fairly good time, each with a message, but of the second 6 let go, none returned. The weather was all that could be desired and the birds were well cared for up to time of liberation.

On the 30th August, Sergt. Mulholland, R.E., proceeded in the same steamer to Sable Island in charge of 21 birds to be let fly from there. On 2nd September, of these 21 birds, 14 were let go in groups of 2 and 3, each with a message, and in presence, among others, of Mr. Ogden, the inspector of life boats, &c., and Mr. Boutilier the superintendent of the island. The weather was most favourable, but notwithstanding this fact, they acted very badly, and hung round the island for hours, two hours after liberation 6 were counted resting on a building, and at 2 p.m. next day, one was observed in the rigging of the “Newfield,” which would then be about midway between Halifax and Sable Island. The birds seemed to be put off their course, and much worried with sea gulls, these latter flying up to and circling round with the pigeons. When the pigeons were heading for Halifax, these birds would seem to divert their attention, and cause them to come back to the island.

Up to date only one of these 14 have returned, viz., H. 190, which arrived at its loft on Tuesday 24th inst., 22 days after being liberated. The remaining 7 birds were left on the island to be let fly the first fine day. This was no doubt done on Saturday 7th September, as one bird arrived at 9 a.m. on Sunday 8th September, with a message showing that it was liberated at 10 a.m. the previous day. Of these 21 birds, five had previously made the flight successfully, but only one (H. 190) made it the second time.

After the experience of this and previous years' trainings it appears that the establishment of a certain and reliable pigeon service between Sable Island and Halifax is impracticable, but at the same time, given favourable conditions of wind and weather, I see no reason why the service should not be partially successful.

The great prevalence of fog on this coast, together with the persecution of sea gulls, seems to me to be the main cause of loss of birds, and failure, but when five birds out of six make the passage from Sable Island without difficulty it is evident that when more birds have been carefully trained, the same result may happen again; and when it is remembered that one successful message from Sable Island may mean the saving of many lives, and valuable property it would be a pity if the efforts to maintain communication by this means were abandoned, because the service is not always reliable. What is needed to improve is, firstly:—a competent, and intelligent caretaker, who can give his whole time and attention to the training and breeding of the birds, and who shall be continuously with them, at any rate during the summer months.

At present the caretaker has to be taken away for his musketry course and his field training in the middle of the training season.

Sergeant Mulholland has devoted a great deal of time and attention to the birds, but he has many other duties to attend to, and cannot give them undivided attention. I consider that such success as has attended the training has been mainly due to the trouble he has taken over the matter. He is, I regret to say, about to be sent home and his relief is expected from England next month.

If it is decided, therefore, after the results of this year, to discontinue the service the loft had better be closed without delay, but if it is decided to persevere in the attempt, the new loft, proposed by Captain Mills, R. E., my predecessor, should be erected, as the room now occupied by the pigeons is urgently needed for the signal service, and besides a properly constructed loft would give a better chance to the birds.

I would suggest that the pigeon service to Sable Island would probably stand a far better chance of success if the pigeon loft were moved to Canso, or some spot immediately opposite the island, provided the service of a competent caretaker could be obtained. The birds would then have only some 90 miles to fly, and the percentage of successful flights would probably be far higher than what is reached at present. There would not, however, be the same facilities for training at intermediate distances as there are here.

In conclusion I would repeat that the maintenance of a successful and reliable pigeon service between Sable Island and Halifax, appears practically impossible, but if it is considered that the arrival of an occasional message from the island would repay the cost of maintaining the service, I would recommend that the new pigeon loft be constructed without delay.

I must take this opportunity of placing on record the many kindnesses and courtesies I have received free of charge, from the shipping merchants and masters of vessels, in the training of pigeons.

I should particularly mention Captain MacNevin and officers of the ss. "City of Ghent," which steamer did most of the eastern shore training up to 90 miles, before taking the birds on their sea flights and to Sable Island.

I have the honour to be, sir, your obedient servant,

H. V. KENT, *Capt., R.E.*
Superintendent of Signals.

APPENDIX No. 10.

REPORT OF CHAIRMAN OF BOARD OF EXAMINERS OF MASTERS
AND MATES.

HALIFAX, N.S., 23rd August, 1895.

The Deputy Minister,
Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit the annual report of the proceedings of the Board of the Examiners of Masters and Mates, from the 30th June, 1894, to the 30th June, 1895, the end of the fiscal year.

The Board met for examinations as follows :—

Port of Halifax.....	10 times.
“ St. John.....	9 “
“ Yarmouth.....	5 “
“ Quebec.....	1 time only.
Total.....	25 times.

There were also 4 examinations for candidates who made application for sea-going certificates at Victoria, B.C., the papers and problems being forwarded to the agent of the Department of Marine and Fisheries at that port (who acts as examiner for the province), and returned to Halifax for inspection and approval of the Chairman of the Board.

At Halifax 11 applications were made for sea-going certificates of competency as master, and 11 for mates, and also 1 for second mate.

11 masters, 8 mates and 1 second mate received certificates. 12 applications were made for certificates of competency as master of coasting and inland vessels, and 3 for mates.

11 masters and 3 mates received certificates.

At St. John 11 applications were made for sea-going certificates as master competency, and 10 certificates were issued to successful candidates.

20 sea-going officers applied for mates certificates and 1 for second mate.

13 mates and 1 second mate were granted certificates.

At Yarmouth 7 applications were made for sea-going certificates of competency as master and there were three candidates for mates' and 1 for a second mate's certificate.

7 masters, 3 mates and 1 second mate received certificates. 2 applications for certificates of competency as master coasting, and 4 as mates were examined at this port and all obtained certificates.

At Quebec 2 candidates applied for masters' certificates sea-going, competency, and were granted certificates.

1 candidate applied for a certificate as mate, but was not examined on account of illness.

At Victoria, B.C., 3 applications were made for masters' certificates of competency sea-going and 7 for mates'.

3 masters and 4 mates received certificates.

By the foregoing statement it will be observed that for the 12 months ending June 30th, 1895, 34 applications were made for masters' certificates of competency sea-going, 42 for mates' and 3 for second mates'.

33 masters, 28 mates and 3 second mates were granted certificates.

14 applications for certificates of competency as master coasting were made to the Board of Examiners and 7 mates.

13 masters and 7 mates obtained certificates.

17 certificates of service were issued through the Halifax office, for masters coasting and 7 for mates and 8 renewal certificates of all grades.

The total number of certificates granted by the Department of Marine and Fisheries at Ottawa, including competency, service and renewal, upon applications made to the Board of Examiners at Halifax, was 116 and fees to the amount of \$1,068 were collected, and deposited to the credit of the Receiver General and the bank receipts for same forwarded to the department monthly.

The fees for the examinations of candidates at Victoria are sent direct to Ottawa by the agent of Marine and Fisheries, at that port, and are not accounted for by the chairman of the Board at Halifax.

This report does not include certificates of competency for coasting and inland waters, issued by the department upon examinations at any other ports than those above mentioned.

At St. John the local member of the Board holds examinations for coasting and service candidates and makes the return to the department at Ottawa direct.

Amongst the applications above enumerated, some candidates have presented themselves a second or third time for examination, for master or mate, as the case may be, having previously failed.

The names of these candidates appear upon the books at this office each time they come forward to be examined. They are, however, permitted to have a second trial without paying another fee, but on each successive occasion after that, no matter how often they present themselves, the full amount of the fee is again collected from them.

I regret to state that a number of officers holding mates certificates and making application to be examined for masters' certificates of competency, sea-going, are not capable of passing the examination upon the deviascope, as required by the regulations of the Board of Trade.

In all such cases I submit the question upon the deviation of the compass (No. 19), which was formerly part of the examination, to be written by the candidates.

It is important that officers who are in steel built vessels, should have a proper knowledge of the causes of the deviation of the compass, and it ought to receive a much greater amount of attention than appears to be given to it at present, and I am of opinion that more care should also be observed by shipowners in the selection of a good position for the standard compass in many of the small steamers upon our coast and upon the lakes.

They ought also to avoid if possible placing it in the vicinity of any vertical iron.

No doubt many masters of Canadian registered vessels have a fair knowledge of the subject of deviation, but from the conversation I have occasionally had with the officers who present themselves for examination, I am led to believe that few captains show a desire to impart that information which they have acquired, to their subordinates.

There also appears to be a disposition on the part of many masters of sailing vessels not to allow their officers free access to the charts on board, so that they could obtain information themselves in matters pertaining to the navigation of the ship during the voyage and ascertain where the vessel was and upon what course she was steering.

On account of the practice of such narrow minded policy, many officers who are examined by the board, are deficient in their knowledge of the use of the chart and in some cases candidates have been failed on that account.

I have also been informed that some masters of ships do not encourage their officers to take solar or stellar observations with the quadrant or sextant and work these observations up to ascertain the ship's position, but navigate the ships entirely by themselves, without the aid or assistance of their officers.

Such men in command of vessels must certainly lose sight of the fact that there should be some one on board besides themselves, capable of taking full charge of the ship in case of sickness, death, or any other emergency.

The first mate has occasionally to keep watch himself, and work and manœuvre the ship, and it is impossible to take this responsibility if he is kept in the dark with reference to the position of the vessel.

When he relieves the deck officer and assumes charge, it is proper for him to know where the ship is, where she is making for, and why she is steered upon any particular course by the compass.

I am of opinion that the standard of examination for masters of coasting vessels should be raised.

At present the regulations prescribe only one problem in navigation for those candidates, "Latitude by the Meridian Altitude of the Sun," and the examination required of them is not equal to that laid down and authorized by the Board of Trade for a second mate, sea-going, who has very little responsibility in the navigation of the ship.

Some candidates for certificates as master coasting competency, having been successful in passing the examination and obtaining certificates, have then actually returned to school to get more instruction in what is really necessary in navigation, before taking charge of a vessel.

I am also of opinion that service certificates should cease to be issued on and after January 1st, 1896—three month's notice being given before such action takes place.

Those who may have been desirous of obtaining these certificates have had ample time to make their applications, and many of them have been living on shore for years, employed in farming and other occupations, and have had no opportunity of keeping up their connection with seafaring people and ships, and consequently have very little knowledge of the rule of the road.

I also desire to state that in my opinion it is necessary for all men who take charge of either sailing or steam vessels, of whatever class or size, even those who have charge of small tugs and lighters, should have a good acquaintance with the rules and regulations for preventing collisions, as they have to exercise their knowledge every day when going up and down our harbours, and during the summer months we very frequently find that a large number of women and children go on board small steamers to various places for picnics, the steamers often returning to their wharfs after dark, and having to pass many other vessels moving in all directions.

W. W. SMITH,
Chairman.

APPENDIX No. II.

REPORT OF ALFRED OGDEN AS TO EFFICIENCY OF LIFE STATIONS,
BOATS AND CREWS.

BEDFORD, N.S., 11th November, 1895.

WM. SMITH, Esq.,
Deputy Minister of Marine and Fisheries,
Ottawa.

SIR,—I inclose, herewith, my report upon the inspection of life saving stations for 1895.

Pictou Island Station.

On the 7th June last, while on Pictou Island in connection with the Bay View lobster hatchery, I had an opportunity of inspecting this station. The coxswain and one of the crew only were on shore, the others were out fishing as they usually are in fine weather. The boat was nicely painted, in good order and everything about the boat-house clean and in its proper place.

The old cork jackets mentioned in my report last year as being "tender and uncomfortable to the wearer" are still there and new ones should be supplied.

I have seen the crew in active service, they are first-class men and excellent oarsmen.

Scatarie Island Station.

Inspected 15th August.—The boat is in good condition and nicely painted. The boathouse is also kept clean and in good order.

Of the crew five were present, the others were out fishing, I did not have the boat launched.

The windlass at this station is not strong enough for the work it has to do, and I would recommend that a double barrel winch with 1-12 inch block with steel bush and pin be supplied.

White Head Station.

Inspected 20th August.—The launch ways had been well repaired, but for want of paint and oil the boat had not been painted this year, otherwise the boat and all appliances were in good condition.

The coxswain only was at home the crew all being out fishing, and as I had exercised the crew on previous visits, and knowing them to be a good crew I did not wait for their return from the fishing grounds to launch the boat.

Sable Island Station No. 1.

The boats and appliances at this station are in a good serviceable condition except the launch ways and the despatch boat.

The launch ways are about worn out and should be renewed, a sufficient quantity of pitch pine timber of suitable dimension has been washed ashore at this station, and Superintendent Boutellier says he will use this material in constructing new ways.

The despatch boat which I reported upon fully last season as being weak and unfit for the service it was intended for, "has been patched, puttied and painted and possibly would in fair weather make a voyage in safety to the main land.

The rocket apparatus recommended in my report of 1893 has not yet been supplied.

Sable Island Station No. 3.

At this station there is one surf boat in good condition, also a metallic life boat, "Grace Darling," which should be painted inside to prevent rust; this the coxswain promised to attend to at once. Otherwise this boat appeared to be in very good order.

I arrived off No. 4 station at 9 o'clock at night but had no opportunity of seeing the boats as the "Newfield," after taking on board some passengers, sailed for Halifax.

I have visited the houses of refuge and the quarters of the staff and found everything clean and comfortable.

The superintendent informs me that in the event of a large number of persons being landed upon the island, there is always on hand about 90 head of horned cattle and from 25 to 100 barrels of flour, together with a good supply of other stores.

Herring Cove Station.

Inspected 24th September.—This boat and boathouse are kept in good order and everything about the premises clean and in good shape. The boat is metallic and very heavy for the crew to hand up. They often obtain assistance from outsiders. I would recommend that two pieces of 8 inch x 3 inch scantling 25 feet long with hardwood rollers, be placed on the floor of the boat house which will lighten the labour and save the bottom of the boat.

Two lanterns and one 9-inch patent block are also required.

The coxswain only was at home when I visited this station.

Duncan's Cove Station.

Inspected the 24th September and found everything in good order, except the boat which needs painting.

Coxswain reports no paint or oil on hand for the boat.

The crew were all out fishing as usual in fine weather.

Devil's Island Station.

Inspected 9th October.—The boat, boat house and all appliances are in good order. The crew being all present and a heavy sea running, the boat was launched and run through the breakers several times and was well handled by the crew.

A 3-gallon water keg and one iron bucket is required.

Port Mouton Island Station.

Inspected 25th October, 1895.—The boat is in good order, nicely painted, and all appliances in their proper places. The launch ways are not in good condition and will require about \$20 to place them in order. In their present state the boat is liable to get damaged if launched in rough weather.

The boat was launched and the crew exercised; they are good men and excellent oarsmen.

Blanche Station.

30th October.—The boat was taken on board the steamer "Lansdowne" to be carried to Halifax for repairs, and another boat landed to take its place. The launch ways had been repaired, everything in good order, and all materials recommended last year had been supplied.

Cape Sable Station.

31st October.—The metallic boat is nicely painted, boat house had been removed and repaired. The boat had not been launched since 1887. There being no wrecks there since that time.

Seal Island Station.

4th November.—This boat, a Bebee-McLellan, is in good order; had her launched and the crew exercised, they are good oarsmen. *

The old boat at the west side is in good order, but the forward thwart is too close to the bulk head, I gave the coxswain instructions to change it to suit.

The dwelling house occupied by the coxswain and his family is small and inadequate for his requirements, and the men's quarters present a dingy and very gloomy appearance.

I would recommend that additional room be made for the coxswain and that paint and oil be supplied to improve the appearance of the new quarters.

The coxswain, an active and intelligent man, is of the opinion that he can, by placing cork at each end of the boat make it self-righting, I quite agree with him and recommend that one hundred pounds sheet cork and five pounds paraffine wax be supplied at once for that purpose.

One steering oar twenty feet long and one axe are required.

Mud Island Stations.

4th November.—Arrived at 6.30 p.m. and anchored off the island, as the night was dark and a heavy surf on the rocks it was impossible to land, and the "Lansdowne" proceeded towards Yarmouth.

Yarmouth Station.

5th November.—Arrived at three o'clock p.m., coxswain and crew were all absent and no person connected with the crew could be found. I sent one of the men belonging to the steamer to the residence of the coxswain for the key of the boathouse, he returned without it as the coxswain was in town, and his wife refused to send the key or open the boathouse. The coxswain lives about three-quarters of a mile from the boathouse and the crew are scattered about the settlement.

I could only see the boat through the windows, it appeared to be well painted and the outside launchways were in good order. At all other stations on the coast I have always found some of the crew present and the boathouse opened within five minutes after my arrival at the station.

Cape Tormentine Station.

8th November.—The boat and all appliances are in good order; launched boat and exercised the crew who are good oarsman and able bodied.

The supplies and materials recommended for launch ways, &c., in my report of last year have not been furnished.

I would strongly urge that the materials I recommended last year be furnished.

The winch sent there for the purpose of hauling up the boat is worthless for that purpose, a good double barrel winch is required.

I would strongly urge that the materials I recommended last year be furnished at once, as in its present state this station is not efficient.

STATEMENT relative to Life-Boat Stations

Stations.	Established.	Coxswain.	Number of Crew.	Salary of Coxswain.	Wages of Crew.
Blanche, N.S.	Sept.—, 1896	W. A. B. Smith.	6	\$75 per annum and \$1.50 for each drill	\$1.50 each drill, twice a month.
Cape Sable, N.S.		Lightkeeper	No organized crew.		
Cobourg, Ont.	Nov. 7, 1882	D. Rooney.....	6	\$75 per annum and \$1.50 for each drill	\$1.50 each drill, twice a month.
Collingwood, Ont.	Sept. 2, 1885	P. Doherty.....	6	do ..	do ..
Devil's Island, N.S.	1885, reorganized in 1890.	F. Edward	6	do ..	do ..
Duncan's Cove, N.S.	1886.....	R. E. Monk.....	6	do ..	do ..
Goderich, Ont.	Oct. 21, 1886	Wm. Babb.....	6	do ..	do ..
Herring Cove, N.S.		J. Dempsey	No organized crew.		
Mud Island, N.S.		J. Pitman.....	do	\$30	
Pelé Island, Ont.		A. Henning	6	\$75 per annum and \$1.50 for each drill	\$1.50 each drill, twice a month.
Pictou Island, N.S.	Nov. 23, 1889	D. McLean.....	6	do ..	do ..
Poplar Point, Ont.	Apl. 20, 1883	L. Spafford.....	6	do ..	do ..
Port Hope, Ont.	Nov. 6, 1889	C. R. Nixon.....	6	do ..	do ..
Port Mouton, N.S.	do —, 1889	J. Maxwell	6	do ..	do ..
Port Rowan, Ont.	Oct. 19, 1883	Richard Clark..	6	do ..	do ..
Port Stanley, Ont.	June 25, 1885	Wm. Berry.....	6	do ..	do ..
Sable Island, N.S.	1885.....	Supt. Humane Establishment.	From staff of Humane Establishment.	Paid as superintendent and staff of Humane Establishment.	
Scatterie, N.S.	1885, reorganized in 1890.	J. N. Brown.....	6	\$75 per annum and \$1.50 for each drill	\$1.50 each drill, twice a month.
Seal Island, N.S.	1880.....	W. Trefry.....	7	\$250 per annum..	\$100 each per annum.
St. Paul's Island, N.S.		Supt. Humane Establishment.	No organized crew.		
Tormentine Cape, N.B.		W. B. Walsh, Bayfield.			
Toronto, Ont.	Mar. 1, 1883	W. Ward.....	6	\$75 per annum and \$1.50 for each drill	\$1.50 each drill, twice a month.
Wellington, Ont.	do 17, 1883	H. McCullough.	6	do ..	do ..
Whitehead, N.S.	June 6, 1890	H. P. Monroe..	6	do ..	do ..
Yarmouth, N.S.	1886, reorganized in 1889.	John H. Gavel..	6	do ..	do ..

maintained by the Dominion Government.

Value of Boat.	Description of Boat.	Equipment.	Where built.
\$			
575	Self-righting and self-bailing, 25 ft. over all, 8 ft. beam, Dobbins' pattern.	Full equipment, as required in regulation boat-house.	Dartmouth, N.S.
.....	Metallic life-boat, 16 ft. keel, 5 ft. beam....	Ordinary outfit.....	
575	Self-righting and self-bailing, 25 ft. over all, 8 ft. beam, Dobbins' pattern.	Full equipment, as required in regulation boat-house.	Goderich, Ont.
575	do do ..	do do ..	do
575	do do ..	do do ..	Dartmouth, N.S.
575	do do ..	do do ..	do
575	do do ..	do do ..	Goderich, Ont.
.....	Metallic life-boat, 23 ft. keel, 6 ft. beam....	Full equipment.....	New York.
.....	Fishing boats and dorys (not Government property).	.....
575	Self-righting and self-bailing, 25 ft. over all, 7 ft. beam, Dobbins' pattern.	Full equipment, as required in regulation boat-house.	Goderich, Ont.
575	do do ..	do do ..	Dartmouth, N.S.
550	Self-righting and self-bailing, 26 ft. over all, 7 ft. beam, Dobbins' pattern.	do do ..	Buffalo, U.S.
620	do do ..	do do ..	Goderich, Ont.
575	do do ..	do do ..	Dartmouth, N.S.
.....	Surf-boat, 26 ft. long, 6½ ft. beam.....	Full equipment and boat-house.	Buffalo, U.S.
575	Self-righting and self-bailing, 25 ft. over all, 7 ft. beam.	do do ..	Goderich, Ont.
.....	The two Dobbins' pattern boats were exchanged in 1893 for one Beebe surf-boat and carriages, and one Beebe McLellan self-bailing life-boat.	Boat-house, full equipments,&c.	
.....	Self-righting, &c., same as others, Dobbins' pattern, and clinker built ships' life-boat, 21 feet keel.	Full equipment and boat-house.	Dartmouth, N.S.
.....	Beebe McLellan boat on east side and a surf-boat on the west.	do do ..	Halifax, N.S.
.....	Two surf-boats, one 25 ft. over all, 6½ ft. beam, the other 23 ft. long, 4 ft. 8 in. beam.	.....	do
.....	.....	Not yet equipped.....	
575	Self-righting, &c., same as others, Dobbins' pattern.	Full equipment and boat-house.	Goderich, Ont.
1,400	do do ..	do do ..	Buffalo, U.S.
575	do do ..	do do ..	Dartmouth, N.S.
575	do do ..	do do ..	do

APPENDIX No. 12.

List of persons to whom rewards have been granted by the Government of Canada, for the fiscal year ended 30th June, 1895, for gallant and humane services rendered in life saving from shipwrecked vessels, or by British and Foreign Governments for similar services rendered by Canadian vessels in saving life from shipwrecked British and Foreign vessels for the same period.

Names and Designations of Persons.	Nature of Services Rendered.	Date of Services Rendered.	Description of Reward.
John Gavel, coxswain of life boat at Baker's Cove, Yarmouth. N.S., part of crew with three volunteers and Capt. Cann with his tug.	Went to rescue the crew of the American schooner "Alfred Keene" of Rockland, Maine, which struck on Trinity Ledge.	March 31, 1895	The sum of \$10 was given to each of the crew and \$13 to the owner of the tug for towing boat.
H. McCullough, coxswain of Wellington, Ontario, and lifeboat crew.	Went to rescue of crew of steam barge "Aberdeen" which stranded at Weller's Bay.	Nov. 27, 1894.	The sum of \$3 was paid to each of the crew of the life-boat, ten in all.
Capt. Wm. Babb and crew of life-boat at Goderich, Ont.	Went to rescue of Canadian schooner "M. L. Breck" and American schooner "Home," disabled in a gale.	Oct. 11, 1894.	The expenses for towing the life-boat were paid.
Capt. Knickle, master of schooner "Alaska" of Lunenburg, N.S.	Services rendered French vessel "Emilie" on the banks of Newfoundland.	Sept., 1894	A binocular glass in aluminum from the President of the French Republic.
Alex. McDonald (John's son), J. McDonald, Alex. McDonald (Turner) and John McQuarrie, all of Little Mabou, Nova Scotia.	Rescued John A. McDonald, Alex. Campbell and Miss Kera McDonald, all of Port Hood, N.S., from drowning. The above persons were in a boat which was upset in a heavy sea.	August, 1894.	A silver watch with name engraved to each of the rescuers presented by the Minister of Marine and Fisheries.
Capt. John M. Allen, master, and Thos. Mooney, and H. P. Patterson, of the brigantine "Sullivan," of Boston, Mass.	Went to the rescue of the crew of the schooner "Granville" of Annapolis, N.S., disabled in a gale.	Feb. 12, 1895.	A gold watch to Capt. Allen and a silver watch to Mr. Mooney and Mr. Patterson.
Capt. A. Jennings, master, F. B. Crosby, mate, C. J. Carson, carpenter, M. Nussab, boatswain, R. D. Impett and A. T. G. Evans, quarter-masters of the steamer "Iran" of Liverpool, Eng.	Went to the rescue of the crew of the brigantine "Prussia" of Lunenburg, N.S., disabled in a gale.	Feb. 12, 1895.	A binocular glass to Captain Jennings, a gold watch to F. B. Crosby and silver watches to each of the others of the rescuing crew.
Francis Byers, master, and crew of the British steamship "Creole Prince."	Went to the rescue of the crew of the schooner "Coronet" of Lunenburg, N.S., foundered at sea.	Oct. 22, 1894.	The thanks of the Government of Canada and payment to the owner of the "Creole Prince" of £5 2s. for compensation for the subsistence of the shipwrecked crew.
Capt. J. J. Mehegan, master, J. E. Tripp, 1st mate, and four seamen of the British steamer "Glenwood," of West Hartlepool, Eng.	Went to the rescue of the master and four of the crew of the schooner "St. John" of St. John, N.B.	Oct. 29, 1894.	A binocular glass to Capt. J. J. Mehegan, a gold watch to J. E. Tripp and £2 each to P. Peterson, J. Wright, D. Firmano and W. Stern, and paid £14 5s. for subsistence of the shipwrecked crew.
Frank Nickerson, John Nickerson and Moses Nickerson, of Cape Sable Island, Shelburne County, N.S.	For services in rescuing Lovitt Nickerson from an upturned fishing boat off the Tusket Islands, Yarmouth County, Nova Scotia.	April 12, 1894.	A silver watch to Frank Nickerson who saved the life of another man when 12 years of age.

APPENDIX No. 12.—List of persons to whom Rewards have been granted by the Government of Canada, &c.—Concluded.

Names and Designations of Persons.	Nature of Services Rendered.	Date of Services Rendered.	Description of Reward.
David Mills and William Duggan, fishermen, of Merigonish Ponds, Pictou Co., Nova Scotia.	Humane services in rescuing the crew and passengers of the steamer "Eldon" of Pictou, N.S., which vessel went ashore in a heavy gale near Merigonish, N.S., on the south shore of the Strait of Northumberland.	April 26, 1893.	A silver watch to each.
Henry Chrimes, 1st officer, A. Hewitt, 1st engineer, E. Stannard, 2nd officer, C. Golburne, 3rd officer, Thos. Stevens, boatswain, James Campbell, master, and the cook of the Str. "Bentala" of Liverpool, G.B.	Humane and gallant services in rescuing the crew of the barque "Howard A. Turner" of St. John, N.B., disabled in a gale.	Jan. 19, 1890.	A gold watch to 1st officer, value £20; gold watches to 1st engineer and 2nd officer, value £15; a silver watch to 3rd officer, value £9; silver watches to boatswain and cook, value £4 9s. 2d., and a binocular glass to J. Campbell and an allowance of £10 for subsistence of shipwrecked crew.
Ottavio Francesco, mate, C. Giovanni, cook, G. Michele, A. B. L. Giovanni, A.B., and Dona Pietro, A.B., of the Italian barque "Savina" of Genoa.	Humane services in rescuing the crew of the barque "Harriet Upham" of Londonderry, N.S., disabled at sea.	Feb. 7, 1888.	£2 10s. to each of the seamen, and payment to the owners of £26 10s. for damages sustained by the Italian vessel in the rescue.
Wm. Sampson, master, O. B. Thompson, 2nd officer, Hans Hansen, A.B., C. Dobbelaere, A.B., K. Karbooe, A.B., and W. T. Nylund, A.B., of the Str. "Sandfield," of London, Eng.	Humane services in rescuing the crew of the schooner "Unexpected" of Windsor, N.S., disabled in a gale.	Jan. 26, 1893.	A binocular glass to the master of "Sandfield," a silver watch to the 2nd officer, and £2 to each of the four seamen who manned the rescuing boat, and £12 for subsistence expenses of the shipwrecked crew.
Jacob Wyman, master, C. D. Grant, 1st officer, C. Pri-fert, A.B., R. Wessel, A.B., John Williams, A.B., and P. H. Swensen, A.B., of the barque "Buteshire," of St. John, N.B.	Gallant and humane services in rescuing the crew of the American schooner "Florence J. Allen" disabled at sea.	Feb. 11, 1895.	A gold watch and chain to the master of the "Buteshire," a gold medal to the 1st officer, and silver medal to each of the four seamen who manned the rescuing boat. Presented by the President of the United States.

APPENDIX No. 13.

STATEMENT of Sick Mariners' Dues collected for the fiscal Year ended 30th June, 1895.

<i>Quebec.</i>	\$ cts.	<i>Nova Scotia—Concluded.</i>	\$ cts.
Gaspé.....	84 32	Canso.....	262 08
Montreal.....	3,249 14	Digby.....	70 14
New Carlisle.....	319 62	Halifax.....	5,818 42
Perce.....	35 66	Kentville.....	10 68
Quebec.....	5,832 82	Liverpool.....	74 83
Rimouski.....	338 60	Lockeport.....	30 90
St. Armand.....	4 22	Lunenburg.....	459 14
St. John.....	1,109 10	Margaretville.....	5 22
Sorel.....	94 00	North Sydney.....	1,198 36
Stanstead.....	22 23	Parraboro'.....	1,690 82
Three Rivers.....	196 62	Pictou.....	439 52
Total.....	11,287 33	Port Hawkesbury.....	191 73
		Port Hood.....	2 96
<i>New Brunswick.</i>		Shelburne.....	136 16
Bathurst.....	279 04	Sydney.....	2,873 27
Chatham.....	1,191 16	Weymouth.....	156 00
Dalhousie.....	565 86	Windsor.....	782 83
Dorchester.....	40 16	Yarmouth.....	370 22
Moncton.....	949 90	Total.....	15,031 47
Newcastle.....	857 64		
Sackville.....	185 08	<i>Prince Edward Island.</i>	
St. Andrews.....	114 86	Charlottetown.....	426 30
St. John.....	4,922 00	Summerside.....	124 30
St. Stephen.....	67 02	Total.....	550 60
Total.....	9,172 73		
		<i>British Columbia.</i>	
<i>Nova Scotia.</i>		Nanaimo.....	3,199 76
Amherst.....	611 92	New Westminster.....	176 58
Annapolis.....	123 22	Vancouver.....	1,324 12
Arichat.....	6 16	Victoria.....	2,091 16
Antigonish.....	149 34	Total.....	6,791 62
Baddeck.....	166 88	Grand total.....	42,815 74
Barrington.....	11 56		
Bridgetown.....	4 32		

F. GOURDEAU,
Accountant.WM. SMITH,
Deputy Minister of Marine and Fisheries.

APPENDIX No. 14.

58-59 VICTORIA, CHAPTER 26.

An Act to amend chapter 10 of the Statutes of 1892, respecting the Harbour Commissioners of Three Rivers.

[Assented to 22nd July, 1895.]

HER Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. Section six of chapter ten of the Statutes of 1892, intituled *An Act respecting the Harbour Commissioners of Three Rivers*, is hereby repealed and the following substituted therefor:—

“6. No loan shall be effected, and no debentures shall create any lien or charge on the said harbour, until the said commissioners have paid to the Government of Canada the sum of fifteen thousand dollars.”

APPENDIX

STATEMENT of Expenditure by the Marine Department

	1868.	1869.	1870.	1871.	1872.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Maintenance of lights—					
Above Montreal	40,561 28	42,306 69	46,289 05	44,054 01	57,609 16
Montreal District	23,053 56	25,762 54	21,699 49	22,453 52	22,369 00
Below Quebec	45,615 65	41,651 73	43,730 61	31,582 75	41,936 00
Nova Scotia	46,460 72	56,394 88	43,682 86	76,230 77	67,862 24
New Brunswick	20,488 00	23,893 00	27,485 14	20,542 29	23,369 12
Prince Edward Island					
British Columbia					
Construction—					
Above Montreal	3,136 15		2,976 83	8,770 55	6,940 45
Quebec	7,323 75	7,492 59	1,543 06		57,818 35
Nova Scotia	22,041 42	6,905 80	18,967 23	10,948 31	34,760 12
New Brunswick			11,555 91	8,735 73	9,561 14
Prince Edward Island					
British Columbia					
Dominion steamers—					
Quebec	69,026 73	37,176 02	34,549 49	59,797 05	47,500 00
Nova Scotia	14,778 92	26,603 94	19,759 96	13,139 86	20,999 63
New Brunswick					
Prince Edward Island					
British Columbia					12,115 96
Examinations of masters and mates			908 12	1,407 66	4,312 07
Hudson's Bay expedition					
Investigations into wrecks			140 00		874 00
Marine Hospital, Quebec	19,977 36	19,221 45	21,618 73	19,823 18	21,000 00
Marine Hospitals	1,070 86	15,615 71	15,652 62	15,728 93	23,536 16
Meteorological Service	8,200 00	8,950 00	8,950 00	9,379 82	12,618 15
Registration of Canadian shipping					
Removal of obstructions			2,350 07	1,000 00	
Rewards for saving life					2,284 32
Signal Service					
Steamboat inspection	7,106 93	7,999 00	7,396 96	8,321 00	8,500 00
Survey, Georgian Bay					
Water Police, Montreal		10,238 71	9,423 31	8,030 00	10,000 00
do Quebec	27,445 35	12,623 59	9,038 62	9,370 73	10,348 00
Civil Government	15,083 88	18,064 25	19,401 05	20,220 96	22,644 52
Steam communication—					
Between Quebec and Maritime Provinces					
Between Prince Edward Island and Mainland					
Purchase of steamer to replace—					
“Glendon”					
“Lady Head”					
Winter Mail Service, P. E. I.					
Tidal observations					
Gratuities					
Survey, Burrard Inlet					
Export cattle trade					
	371,070 56	360,899 90	367,129 11	389,537 12	518,958 49

No. 15.

from Confederation to 30th June, 1895.

[illegible]

APPENDIX

STATEMENT of Expenditure by the Marine Department

	1882.	1883.	1884.	1885.	1886.	1887.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Maintenance of lights—						
Above Montreal.....	71,048 50	70,116 68	70,788 27	70,697 89	85,718 96	75,690 74
Montreal District.....	21,643 05	22,250 32	22,946 43	23,262 94	33,289 28	16,735 49
Below Quebec.....	91,098 66	102,784 99	101,302 35	118,856 94	131,095 29	131,540 80
Nova Scotia.....	137,846 15	150,793 17	142,909 72	137,439 40	143,153 24	117,708 53
New Brunswick.....	66,073 00	75,947 92	86,670 70	92,130 28	76,046 63	96,425 28
Prince Edward Island.....	16,985 72	17,907 27	19,059 62	20,218 83	22,282 52	17,852 13
British Columbia.....	17,803 00	18,349 06	18,107 54	15,457 76	14,783 75	16,230 43
Cape Race.....						4,453 25
Construction—						
Above Montreal.....	13,581 00	9,782 27	18,432 63	27,977 42	36,678 16	18,383 20
Quebec.....	3,731 31	9,672 50	3,168 48	4,354 87	5,877 84	1,260 00
Nova Scotia.....	13,355 00	9,422 75	12,489 35	4,352 42	5,905 17	5,330 89
New Brunswick.....	2,253 80	1,022 57	2,868 70	7,667 42	2,421 66	5,280 75
Prince Edward Island.....	3,092 00	1,934 49	2,158 60	879 40		384 60
British Columbia.....	3,237 90	1,005 26	9,830 38	5,223 11	4,942 70	321 84
Queen's Printer.....						26 58
Dominion steamers—						
Quebec.....	44,923 98	45,156 13	43,019 13	51,092 98	51,485 03	50,714 52
Nova Scotia.....	31,049 74	37,841 07	27,726 60	42,921 27	30,283 27	32,287 10
New Brunswick.....					24,633 26	14,337 23
Prince Edward Island.....	23,911 97	19,680 00	19,539 52	33,962 54	20,927 58	19,987 67
British Columbia.....	8,504 61	25,484 00	16,111 83	12,485 07	13,430 69	10,809 07
Department.....						13,288 83
Examinations of masters and mates.....	3,982 00	4,021 20	5,580 79	6,656 44	5,239 28	4,858 98
Hudson's Bay expedition.....			480 69	71,374 69	35,217 10	14,762 61
Investigations into wrecks.....	863 19	875 64	830 12	385 15	592 63	520 14
Marine Hospital, Quebec.....	19,938 12	19,998 53	19,990 34	19,996 68	16,047 95	19,706 96
Marine Hospitals.....	33,162 45	29,880 78	31,401 30	35,371 29	32,229 02	32,545 35
Meteorological Service.....	47,464 07	51,990 25	56,418 16	56,625 46	56,898 33	57,140 74
Registration of Canadian shipping.....	2,013 28	168 84	189 27	237 88	157 13	233 13
Removal of obstructions.....	1,116 51	35 80	342 76	2,259 21	1,237 34	4,190 83
Rewards for saving life.....	2,212 00	2,534 60	2,614 91	5,221 15	8,147 22	7,365 94
Signal Service.....		3,365 33	6,704 17	3,881 05	4,622 00	5,082 17
Steamboat inspection.....	14,835 00	16,209 00	21,893 28	23,235 04	21,775 57	22,837 80
Survey, Georgian Bay.....		77 81	26,745 54	20,454 68	17,759 36	21,592 55
Water Police, Montreal.....	21,994 74	15,798 24	19,021 93	17,683 59	20,933 75	17,413 47
do Quebec.....	20,321 82	22,520 41	22,958 79	20,399 33	22,922 82	22,935 65
Civil Government.....	36,789 46	37,988 39	38,775 00	29,900 83	30,453 57	37,193 62
Steam communication—						
Between Quebec and Maritime Provinces.....						
Between Prince Edward Island and Mainland.....						
Repairs to wharfs.....						
Purchase of steamer to replace—						
“Glendon”.....		395 56	56,164 71	47,238 03		
“Lady Head”.....						
Winter Mail Service, P. E. I.....					5,985 42	6,312 38
Tidal observations.....						
Gratuities.....						
Survey, Burrard Inlet.....						
Export cattle trade.....						
Survey, Bay of Quinte.....						
Relief of distressed Canadians.....						
Manning ships.....						
Widow of late A. Warner.....						
McDonald Bros.....						
	774,831 53	825,010 82	927,241 61	1,029,011 14	980,120 59	917,557 31

No. 15—*Concluded.*from Confederation to 30th June, 1895—*Concluded.*

1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
85,588 70	72,621 23	84,035 65	93,180 72	87,033 61	87,598 15	78,090 69	82,541 16
17,510 17	12,285 79	118,750 70	122,471 89	116,531 27	120,404 19	124,348 80	124,763 81
108,278 67	112,680 20		139,916 83	148,815 26	150,445 26	137,339 73	140,877 53
133,009 92	140,197 15	139,459 56	61,608 91	66,886 69	71,079 46	59,917 96	69,654 46
73,465 49	78,285 79	61,608 91	61,089 31	17,069 98	16,819 64	15,569 39	17,976 67
14,796 62	19,118 51	16,968 80	19,000 46	26,858 68	24,413 27	27,240 77	21,734 18
19,604 63	16,877 12	16,411 49	19,595 22				
5,124 20	7,358 01						
6,341 97	8,623 76	23,863 09	9,796 28	21,704 05	8,766 62	12,581 15	2,699 40
2,287 86	12,203 06		3,723 14	809 27	10,097 18	4,743 13	3,004 14
2,533 48	6,039 91		4,596 94	1,965 16	4,381 24	3,104 77	4,737 03
1,542 61	2,966 36		208 16	1,845 35	1,271 15	115 45	1,597 89
			410 00	1 56		1,604 00	
6,918 00	1,890 00		14,417 25	9,478 81	2,958 61	6,357 43	180 83
	40 14						
150,659 19	126,629 33	114,956 20	111,437 03	145,899 61	163,097 46	178,183 97	169,661 64
5,063 96	4,331 04	4,117 83	4,255 24	6,363 88	4,116 99	3,745 33	2,757 29
165 00							
513 91	516 67	888 94	1,172 77	603 21	643 49	850 81	351 15
18,777 62	18,643 14	10,279 08	751 75				
30,667 67	33,689 20	31,450 03	33,303 37	34,106 83	35,757 07	38,403 94	38,589 05
59,986 10	58,577 07	58,452 10	62,457 10	67,138 06	64,165 60	66,440 96	64,588 34
897 02	179 21	647 52	1,207 07	462 59	1,476 19	394 00	207 40
2,500 94	3,603 65	5,737 26	3,633 65	2,878 68	1,564 53	202 02	2,217 36
6,825 48	5,503 44	8,150 92	4,952 20	6,398 93	7,432 64	8,014 67	6,591 34
4,441 59	5,092 54	4,976 80	4,700 79	5,014 42	5,040 58	4,668 93	5,311 74
21,430 45	22,313 03	20,989 52	22,183 76	22,736 59	24,386 95	25,961 36	26,385 88
19,424 14	17,898 46	17,969 23	17,677 51	16,451 10	17,542 11	31,461 76	12,653 28
18,725 95	16,948 82	13,167 00	573 80				
18,553 57	14,698 68	8,620 61	7,279 85	6,161 60	5,436 23		
32,728 78	43,501 96	42,835 78	43,253 67	43,195 31	56,477 21	54,988 88	71,373 82
	143,505 60						
					84 90	1,007 65	824 38
7,740 25	1,842 47	2,752 67	7,012 70	3,309 44	4,376 96	6,497 03	6,138 18
		244 75	1,888 71	711 59	5,099 17	10,172 61	11,507 24
	200 00	80 00	1,025 00			3,261 32	
			1,690 12	2,580 45			
			520 85	1,411 67	1,711 73	1,350 83	2,268 74
					2,085 45		
							7 30
							500 00
							160 00
							4,000 00
883,250 85	1,023,801 34	807,417 53	885,410 11	861,426 80	898,720 03	905,654 34	895,862 28

APPENDIX No. 16.

COMPARATIVE STATEMENT of Lighthouses, &c., and Steamers of the Marine Branch maintained in the respective Agencies, corrected up to 1st December, 1895.

DISTRICT.	Light-stations.	Lights.	Keepers.	Light-ships.	Fog-whistles.	Fog-horns.	Fog-bells.	Fog-guns or bombs.	Whistling-buoys.	Bell-buoys.	Gas-buoys.	Steamers.	Total Expenditure including Steamers in each Agency.	Salaries Paid in the Agencies.	Number of Persons Employed in each Agency.
Province of Ontario.....	* 179	223	173	4	2	11	2			5			\$ 82,503 91		
Light-ships.....	4														
Province of Quebec.....	117	154	138	8	2	9		9			10 (4 with bells)	2	144,990 83	4,685 18 4	Agent, accountant and 2 clerks.
Light-ships.....	8				3		1								
Province of Nova Scotia.....	170	176	175	1	10	6	2	1	16	13		2	179,875 32	3,102 45 4	Agent, accountant, clerk, messenger.
Fog-alarms.....	2														
Light-ships.....	1														
Province of New Brunswick.....	94	120	102	1	4	8		1	4	3		1	92,540 93	3,233 47 3	Agent, accountant, messenger.
Fog-alarms.....	3														
Light-ships.....	1														
Province of Prince Edward Island.....	36	57	42			1			3	1		S.S.	46,155 99	1,400 00 1	Agent.
Province of British Columbia.....	14	19	17		1	5	3			1		"Stanley."	40,612 94	1,623 94 2	Agent, messenger and occasional clerical assistance.
	632 *	768	647	14	22	40	8	11	23	23	10				

* Light-ships and fog-alarms where there are no lights are in these two columns included in the total number of light-stations and lights in the Dominion.

APPENDIX No. 17.

WRECKS AND CASUALTIES.

The total number of casualties to British, Canadian and foreign sea-going vessels reported to the department as having occurred in Canadian waters and to Canadian sea-going vessels in waters other than those of Canada during the twelve months ended 30th June, 1895, was 247, representing a tonnage of 93,914 tons register, and the amount of loss, both partial and total, to vessels and cargoes so far as ascertained was \$767,536.

The number of lives reported lost in connection with these casualties was 54. A statement of the wrecks and casualties will be found in the supplement to this report.

APPENDIX No. 16.

COMPARATIVE STATEMENT of Lighthouses, &c., and Steamers of the Marine Branch maintained in the respective Agencies, corrected up to 1st December, 1895.

District.	Light-stations.	Lights.	Keepers.	Light-ships.	Fog-whistles.	Fog-horns.	Fog-bells.	Fog-guns or bombs.	Whistling-buoys.	Bell-buoys.	Gas-buoys.	Steamers.	Total Expenditure for Maintenance, including Steamers in each Agency.	Salaries Paid in the Agencies.	Number of Persons Employed in each Agency.
Province of Ontario	179	223	173	4	2	11	2		5				\$ 82,503 91		
Light-ships	4														
Province of Quebec	117	154	138	8	2	9		9			10 (4 with bells)	2	144,990 83	4,685 18 4	Agent, accountant and 2 clerks.
Light-ships	8				3		1								
Province of Nova Scotia	170	176	175	1	10	6	2	1	16	13		2	179,875 32	3,102 45 4	Agent, accountant, clerk, messenger.
Fog-alarms	2														
Light-ships	1														
Province of New Brunswick	94	120	102	1	4	8		1	4	3		1	92,540 93	3,233 47 3	Agent, accountant, messenger.
Fog-alarms	3														
Light-ships	1														
Province of Prince Edward Island	36	57	42			1			3	1		S.S.	46,155 99	1,400 00 1	Agent.
Province of British Columbia	14	19	17		1	5	3			1		"Stanley."	40,612 94	1,623 94 2	Agent, messenger and occasional clerical assistance.
	632	768	647	14	22	40	8	11	23	23	10				
	*														

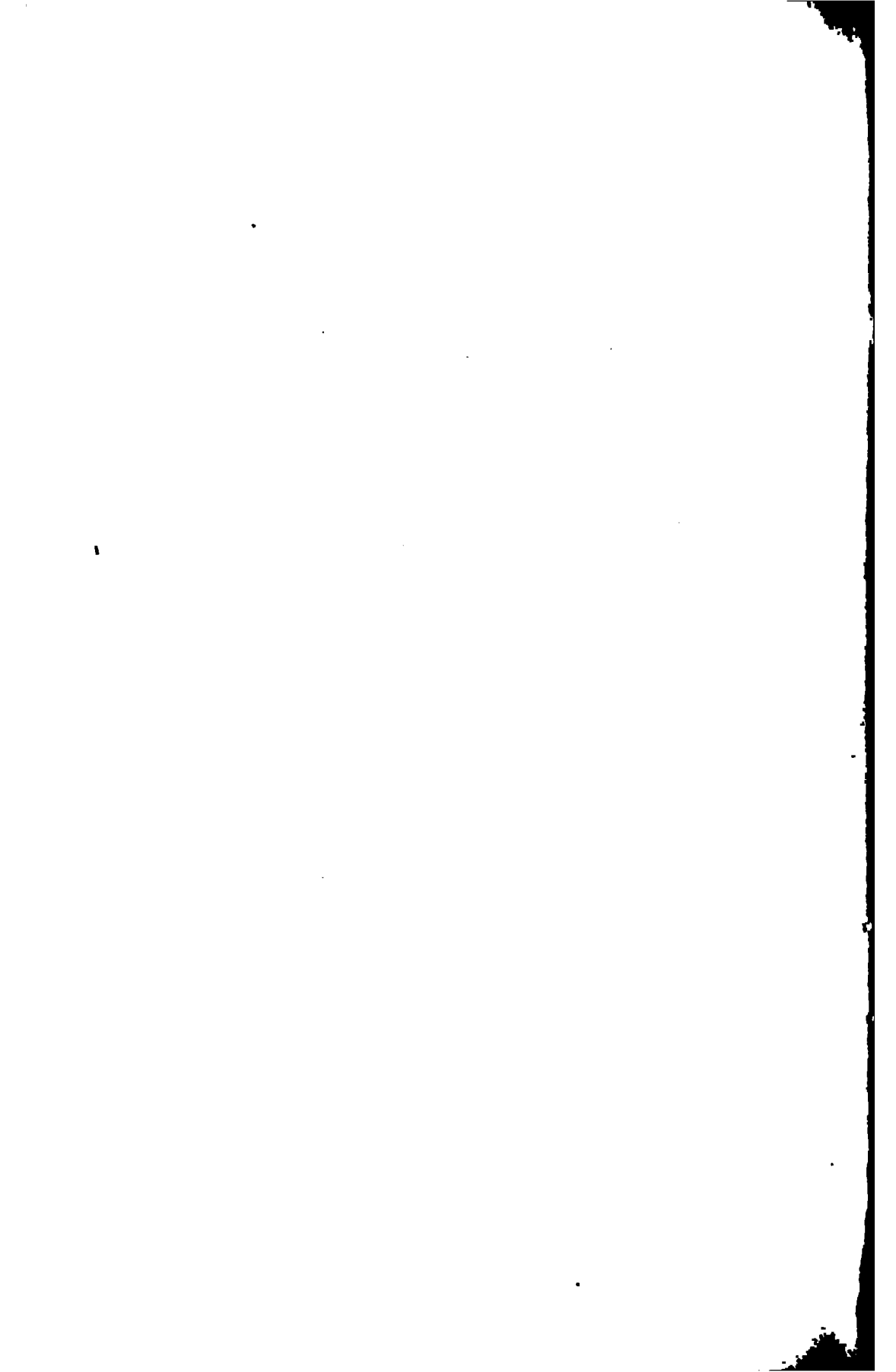
* Light-ships and fog-alarms where there are no lights are in these two columns included in the total number of light-stations and lights in the Dominion.

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The number of lives reported lost in connection with these casualties was 54. A statement of the wrecks and casualties will be found in the supplement to this report.







TWENTY-NINTH ANNUAL REPORT

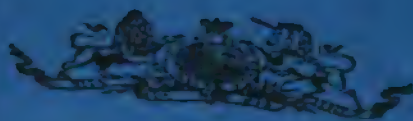
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DEPARTMENT OF MARINE AND FISHERIES

1896

MARINE

PRINTED BY ORDER OF PARLIAMENT



OTTAWA

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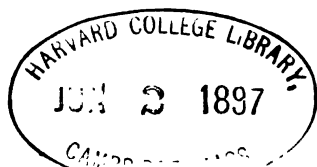


OTTAWA

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1897

Can. Doc. 10.62.5



Am. J. G. Bourne

*To His Excellency the Right Honourable SIR JOHN CAMPBELL HAMILTON-GORDON, EARL
OF ABERDEEN, Governor General of Canada, etc., etc.*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit herewith, for the information of Your Excellency and the Legislature of Canada, the Twenty-Ninth Annual Report of the Department of Marine and Fisheries, Marine Branch.

I have the honour to be,
Your Excellency's most obedient servant,

LOUIS HENRY DAVIES,
Minister of Marine and Fisheries.

DEPARTMENT OF MARINE AND FISHERIES,
OTTAWA, 31st December, 1896.

CONTENTS

	PAGE
Report submitted by Minister.....	
Report of Deputy Minister.....	1

SUBJECTS EMBRACED IN DEPUTY MINISTER'S REPORT.

Buoys and Beacons.....	36
Correspondence.....	62
Coasting Trade of Canada.....	60
Dominion Steamers.....	38
Engineers' Certificates.....	56
Ice Boat Mail Service or Winter Mail Service.....	41
Inside Service Employees.....	58
Lighthouse Service.....	1
do Ontario Division.....	2
do Quebec Division.....	9
do Nova Scotia Division.....	14
do New Brunswick Division.....	21
do Prince Edward Island Division.....	31
do British Columbia Division.....	33
Longitude of Montreal.....	62
Live Stock, Inspection of.....	61
Maintaining Lighthouses and Dominion Steamers.....	38
Merchant Shipping.....	46
Masters' and Mates' Certificates.....	41
Meteorological Service.....	60
Magnetic Observatories.....	60
Messenger Pigeons.....	61
Oils for use of Lighthouses.....	37
Outside Service Employees (Marine Branch).....	59
Obstructions to Navigation, removal of.....	61
Registration of Shipping.....	46
Sick and Distressed Mariners.....	43
Steamboat Inspection.....	56
Wrecks and Casualties.....	43

APPENDICES

Chief Engineer's Report.....	66
Expenditure, Statement of, for 1895-96.....	63
Expenditure since Confederation.....	168
Hydrographic Work, Lake Erie.....	68
Live Stock Shipments.....	152
Life-boat Stations.....	172
Longitudes.....	129
Lighthouses, Stations, etc.....	181
Masters and Mates, Report of Chairman of Board of Examiners.....	137
Meteorological Service.....	116
Magnetic Observatories.....	125
Messenger Pigeon Service.....	140
Revenue Statement.....	65
Rewards for Humane Service.....	178
Steamboat Inspection, Report of Chairman.....	131
Signal Service.....	142
Sick Mariners' Dues.....	180
Tidal Service.....	70
Wharfs, Statement relating to.....	165

ALPHABETICAL INDEX.

A.

	PAGE.
Aids to Navigation, New	2
Arnprior Island	6
Aids to Navigation, Repairs	7
Amherst Island—Repairs to light	10
Air Guns	13
Abbot Harbour Light	15
Amet Island Light—Repairs	10-16
Arichat Light, hand fog-horn supplied	17
Active Pass, fog horn	34
"Aberdeen"	38

B.

Bamford Island, fog-horn supplied	7
Belle Isle—Repairs to Light	10
Barrington Lightship—Repairs	17
Bon-Portage Light—Repairs	17
Brier Island, fire in lighthouse	18
Buoy Service—Quebec Division	13
do Nova Scotia Division	19
do New Brunswick do	28
do P. E. Island do	33
Blonde Rock Automatic Buoy, replaced	21
Beaver Harbour Light—Repairs	24
Big Duck Island Fog Alarm—Repairs	24
Bliss Island Light—Repairs	24
Black Point Automatic Buoy	29
Belle Island Buoys	29
Buctouche Buoys	29
Bathurst Buoys	30
Beaver and Black's Harbour Buoys	30
Bay du Vin Buoys	30
Bay Verte do	30
British Columbia Lighthouse Division	33
Buoys and Beacons	36

C.

Cabot Head Fog Alarm	2
Changes and Improvements at existing Stations	6
Cove Island, Mississauga Straits, Fog Alarms	8
Corbay Lighthouse	8
Cape Salmon Landing Slip	10
Cape Charles—Repairs to Light	11
Cape Despair—Chimney Top	11
Cape Gaspé—Repairs to building	11
Cape Norman—New Boiler	11
Contrecoeur—Repairs to Front Tower	11
Cheticamp—New Tower built	14
Carter Island Light	15
Crouchers Island—Repairs to Slip	17
Canso Harbour, hand fog-horn supplied	17
Cranberry Head Fog Alarm Station—Repairs	18
Cape Race—Boilers	18
Chebucto Head—Boiler	18
Cap d'Or—Boiler	18
Cape Enragé Fog Alarm and Light—Repairs	24
Cape Juriman Light—Repairs	24
Cassell's Point Light do	24
Chebogue Lodge—Can Buoys	30
Crapaud Harbour—Wright's Range Light	32
Cascumpec Harbour Lights—Discontinued	33
Carmanah Light Fog Alarm Station—Repairs	34-36
Cape Beale Improvements	35
Coasting Trade of Canada	60
Correspondence	62
Chief Engineer's Report	66

D.

Deputy Minister's Report	1
Detroit River—Change of Buoys	5
Dover Harbour Lighthouse boat	17
Dominion Steamers	38
"Druid"	40
Dominion Steamers Expenditure	40

E.		PAGE.
Egg Island—Repairs to Light.....	11	
Explosive Bombs.....	13	
East Bay, Bras d'Or Lake new buoys.....	19	
Escominac Light and Fog Alarm—Repairs.....	25	
East Point Light—Repairs.....	36	
Engineer's Certificates.....	56	
Expenditure, Statement of, for 1896.....	63	
Examiners of Masters and Mates—Report of Chairman of Board.....	137	
Expenditure since Confederation.....	168	
F.		
Forteau—Repairs to Station.....	11	
Fog Alarms.....	18	
Fish Island—Repairs.....	17	
G.		
Gas Buoys, Lake Erie.....	4	
do Quebec.....	13	
Grecian Shoal Spar Buoy.....	5	
Gibraltar Point Fog Alarm.....	8	
Glasgow Point, new tower erected.....	14	
Grand Narrows Bridge Light.....	16	
George Island Light Improvement.....	16	
Great Bras d'Or new Iron Can and Spar Buoy.....	20	
Green Head, St. John River, new lighthouse built.....	21	
Gannet Rock Light—Repairs.....	25	
Goose Lake Light—Repairs.....	25	
Grand Harbour Light—Repairs.....	25	
Grand Manan Fog Alarm Station—Repairs.....	25	
H.		
Hilton Wharf Light.....	3	
Heath Point, Anticosti—Repairs to light.....	10	
Halifax Signal Station.....	19	
Halifax Harbour, new buoys.....	20	
Hay Island Light, new dwelling built.....	25	
Head Harbour Light and Fog Alarm—Repairs.....	26	
Hydrographic Survey, Lake Erie.....	68	
Humane Service Records.....	178	
I.		
Improvements to Lights, Quebec Division.....	9	
Isle aux Prunes Lighthouse—Repairs.....	9	
Isle à la Pierre—Repairs to light.....	11	
Isle Haute Light—Repairs.....	17	
Indian Rocks Automatic Buoy.....	23	
Ice Boat Mail Service.....	41	
Inside Service Employees.....	58	
J.		
Jerseyman Island Light, hand fog-horn supplied.....	17	
"Jennie" Lightship—Repairs.....	28	
Jemseg Buoys.....	30	
K.		
Kingston Harbour Buoys.....	6	
Kingsport Light—Repairs.....	17	
L.		
Lighthouse Service.....	1	
do Comparative Statement.....	181	
L'Original Lighthouse.....	8	
Lone Rock Bell Buoy.....	8	
Lamb Island Lighthouse—Repairs.....	8	
Lavaltrie New Lighthouse.....	10	
Lark Islet—Repairs to Fog Alarm.....	11	
L'Islet Richelieu—Repairs to Station.....	11	
Lower Traverse Lightship—Repairs.....	12	
Louisburg Light—Repairs.....	16	
La Have Light Station Breakwater.....	17	
Lurcher Shoal Automatic Whistling Buoy.....	20	
Lepreaux Automatic Buoy.....	30	
"Lansdowne".....	39	
Live Stock Shipments, Inspection.....	61	
do do Report of Inspectors.....	153	
Longitude of Montreal.....	62-129	
Life Saving Stations.....	172	

INDEX.

ix

M.

	PAGE.
Macquereau Point—Repairs to Tower	12
Meaghers Beach Light—Repairs	16
Marache Point Light, hand fog-horn supplied	17
Mauger's Beach, Fog-alarm Station—Repairs	18
Machias Seal Island Light and Fog Alarm—Repairs	26
Miscou Fog Alarm and Light—Repairs	26
Mud Bay Beacons and Platform Buoys	35
Maintenance, Lighthouse and Dominion Steamers	38
Masters and Mates	41
Merchant Shipping	46
Meteorological Service	60
Magnetic Observatories	60
do Report of Director	116-125
Messenger Pigeons	61
do Report S. S. Dickenson	140

N.

Nova Scotia Lighthouse Division	14
New Brunswick Lighthouse Division	21
Neguac Front Range Light changed	23
Neguac Gully Range Light, resumed	23
North Tracadie Gully change of Light	23
New Brunswick and Nova Scotia Coast Buoys, List of	29
"Newfield"	38

O.

Ontario Lighthouse Division	2
Old Proprietor Spindle Buoy	30
Oil for use of Lighthouses	37
Outside Service Employees—Marine Branch	59
Obstructions to Navigation—Removal	61

P.

Port Elgin Light—Assumption of	3
Port Dalhousie Tower Bell and Lighthouse	7
do Crib-work	8
Point Claire Lighthouse—Repairs	7
Point aux Citrouilles—Repairs to Light	12
Point Rich—Repairs to Buildings	12
Point Tupper—Repairs to Lighthouse Tower and Dwelling	14-16
Pictou Range Light—New Towers	15
Petit de Grat—Repairs to Station	16
Point Aconi Breakwater	16
Pugwash Light Station	16
Port Mouton Light—Repairs	17
Purcell Cove Shoal, Halifax Harbour, new buoy	20
Point Aconi Shoals, new Iron Can Buoy	20
Palmer's Landing, new lighthouse built	22
Partridge Island Light, Signal Station and Fog Alarm—Repairs	27
Passamaquoddy Bay Light—Repairs	27
Pea Point Light—Repairs	27
Point Lepreaux Fog Alarm—Repairs	27
Pokemouche Light—Repairs	27
Partridge Island Bell Buoy Boat	29
Prince Edward Island Lighthouse Division	31
Portlock Fog Bell	34
Point Atkinson Light and Fog Alarm—Repairs	36

Q.

Quebec Lighthouse Division	9
do Repairs to existing stations	6
do Division Spar Buoys	13
do Can and Spar Buoys and Beacons	13
Quaker Island Light—Repairs	17
do Hand fog-horn supplied	17
Quaco Fog Alarm and Light—Repairs	28
Quaco Buoys	31
"Quadra"	39

R.

Rains Wharf Range Lights	7
Repairs to Existing Aids	7
Rainy River Range Lights proposed	9
Red Island Lightship—Repairs	12
Richelieu River Light—do	12

R—Concluded.

	PAGE.
Roaring Bull Can Buoy replaced.....	21
Reed's Point Beacon Lights, changed to electricity.....	22
Richibucto Buoys.....	31
Race Rocks Code of Signals.....	34
do Boat Landing and Repairs.....	36
Revenue, Statement of, for 1896.....	65
Rewards for Humane Service.....	178

S.

Sault Ste. Marie Lights.....	3
St. Placide.....	6
South Point, Anticosti Light Tower.....	10
Scatterie Station—Repairs.....	16
St. Paul's Island Light surf boat.....	16
Sambre Light.....	16
Sasibou Light—Repairs.....	17
Scatterie Fog Alarm Station—Repairs.....	18
St. Paul's Island—Repairs to boiler.....	18
Seal Island—Repairs.....	18
Sable Island—Telephone, shelter for horses, &c.....	18
St. Paul's Island Beacon.....	19
St. John's Ledge Bell Buoy—Replaced.....	20
Shediac Harbour Range Lights—Changed.....	22
St. John Harbour Lights—Change in colour.....	24
St. John Beacon Light—Repairs.....	24
South-west Head Light—Repairs.....	28
Spruce Point Light—Repairs.....	28
Swallow Tail Light—Repairs.....	28
Shediac Buoy Service.....	31
Split Rock Automatic Buoy.....	31
Southern Wolf Automatic Buoy.....	31
Souris East Breakwater Light.....	32
St. Peter's Harbour Lights.....	32
Savage Harbour Lights.....	32
Summerside Harbour Range Light.....	32
Sand Head Piles Driven.....	34
"Stanley".....	39
Sick and Distressed Mariners.....	43
do do Statement of Collections.....	180
Steamboat Inspection.....	56
do Report of Chairman.....	131
Signal Service.....	142

T.

The Pillars—Repairs.....	12
Tidnish, N.S.—New buoy on Ballast Ground.....	20
Trinity Ledge Bell Buoy.....	21
Tracadie North—Range light moved.....	23
Tracadie South—Outer light extinguished.....	23
Tidal Survey.....	70

U.

Upper Traverse Lightship—Repairs.....	12
---------------------------------------	----

W.

Western Islands Lights.....	12
West Point Anticosti—Repairs to light.....	10
White Island Reef Lightship—Repairs, &c.....	12
Westhaver Island Light Tower.....	14
West Iron Bound Light—Repairs.....	17
West Point Automatic Buoy.....	33
Winter Mail Service.....	41
Wrecks and Casualties.....	43
Wharfs—Statement of.....	165

Y.

Yarmouth—Boiler.....	18-21
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REPORT OF THE DEPUTY-MINISTER.

To the Honourable

LOUIS H. DAVIES,

Minister of Marine and Fisheries.

SIR,—I have the honour to report on the transactions of the Marine Branch of this department for the fiscal year ended 30th June last, and to give an account of a portion of the business up to date.

In the appendices to this report will be found reports from the Chairman of the Board of Steamboat Inspection, Chairman of Board of Examiners of Masters and Mates, the reports from the Chief Engineer, the Inspectors of Live Stock Shipments, the Director of the Meteorological and Magnetic Service, the Inspector of Signal Service, and reports on the Life-boat Stations, Messenger Pigeon Service, Rewards for Humane Service, together with statements of Revenue, Expenditure, Sick Mariners' Dues, Wharfage, and Wrecks and Casualties.

The amount expended on the various branches of the public service comprised in this department during the fiscal year ended 30th June last was \$792,213.81. The expenditure for civil government, including marine and fisheries, amounted to \$62,476.73, and for civil government contingencies, \$8,226.98.

The amount voted by Parliament for the various branches, not including the departmental salaries, was \$835,640.71. It will thus be seen that during the fiscal year the expenditure was \$43,426.90 less than the amount voted by Parliament.

The whole number of persons in the outside service of the Marine Branch at the date of the report is 1,736.

During the past fiscal year the expenditure for maintenance of lighthouse and coast service amounted to \$448,395.27, and for construction of lights \$17,662.28, total for maintenance and construction \$466,057.55, while for the previous year the expenditure for lighthouse and coast service, including construction was \$475,903.22, showing a decrease of expenditure for the year ending 30th June last of \$9,845.67. The appropriation for this service was \$481,510, the expenditure being \$15,432.45 less than the appropriation of Parliament for the fiscal year.

LIGHTHOUSE SERVICE.

The lighthouse service of the Dominion is divided as follows:—The Ontario division, embracing all lights from Montreal westward to the North-west Territories; the Quebec division, extending below Montreal and including the River and Gulf of St. Lawrence and Strait of Belle Isle; the Nova Scotia division, including St. Paul's Island, Cape Breton, Sable Island and Cape Race, Newfoundland; the New Brunswick division, the Prince Edward Island division, and the British Columbia division,

each including lights within the provincial boundaries. The total number of light stations, light-ships and fog-alarm stations in the Dominion on the 30th of June, 1896, was 629, and lights shown 770, the number of steam-whistles and fog-horns 82, the number of light-keepers and engineers of fog-alarms with masters of light-ships, was 710. Appendix No. 16 contains the number of stations, lights, fog-alarms and steamers in each agency in detail.

ONTARIO LIGHTHOUSE DIVISION.

This division includes the lighthouses and other aids to navigation in that part of the province of Quebec lying west of Montreal, all the lights in the province of Ontario, lights above Montreal, embracing the lights on the Ottawa River, the Great Lakes, and some of the smaller inland lakes, as well as the lights on Lake Winnipeg in the province of Manitoba.

The number of lighthouses, lighted beacons and lightships maintained by the Dominion in the Ontario division, as above described, is 232, located at 184 different stations.

The number of light-keepers in this division paid directly by the Government is 174, but in several cases assistants are employed by keepers, and paid by them out of the allowance made by the Government for that purpose.

There are in Ontario, 2 fog whistles, 11 steam foghorns and 2 fog bells operated by machinery, all located at light stations, as well as 5 bell buoys and 2 gas buoys.

Besides the lights maintained by this department, as above described, there are in Ontario the following aids to navigation: 2 lights on swing bridges, a system of lights on the Murray Canal, maintained by the Department of Railways and Canals, 4 pairs of range lights on the Detroit and St. Clair rivers, maintained by the American vessel owners principally interested, 13 wharf lights maintained by the municipalities or corporations to which the wharfs belong, and 2 range lights maintained by the local interests at Pine Tree harbour.

Eight of these last described stations are aided by this department to the extent of being furnished with the necessary oil for their maintenance.

The lights in this division with the exception of those on the Bay of Quinté, the Ottawa River, and the small lakes were inspected during the months of July and August, by Mr. Patrick Harty, Superintendent of Lights, and supplied with the necessary stores for annual maintenance. It was found impossible, this season, to make a regular inspection of the lights in the Ottawa River.

NEW AIDS TO NAVIGATION.

Cabot Head Light and Fog Alarm.

Mention was made in last year's report of the beginning of the erection of a lighthouse and fog alarm on Cabot Head in Georgian Bay. The construction was completed early in the spring and the lighthouse and fog alarm were put in operation on the 18th of May last.

The lighthouse stands on top of the cliff, about $\frac{1}{3}$ mile eastward from the entrance to Wingfield Basin, at the point of Cabot Head which projects farthest north, on the ordinary course of vessels.

The site is level and elevated 35 feet above water. The light building consists of a tower and dwelling house combined, built of wood, painted white. The square tower rises from the east corner of the building, and is surmounted by an iron lantern painted red. The height of the building from the ground to the vane on the lantern is 54 feet.

The light is a group revolving white light, showing three bright flashes with intervals of twenty seconds between their points of greatest brilliancy, followed by an interval of forty seconds during the greater part of which the light is obscured, the light completing a revolution in 80 seconds. It is elevated 80 feet above the level of the bay and should be visible 14 miles from all points of approach by water. The illuminating apparatus is catoptric.

The fog-alarm building is located on the beach, about 200 feet eastwardly from the lighthouse. It is a square wooden building, painted white, with duplicate horns projecting from a gable in the north-easterly front of the building. These horns are elevated 20 feet above the water.

The fog-alarm consists of blasts of a horn operated by steam and compressed air of 8 seconds' duration with intervals of 40 seconds between them.

The boiler and machinery are in duplicate, so that in case of an accident happening to one part it may be promptly replaced by its duplicate part.

The total cost of construction in connection with the establishment of these buildings has been \$7,473.59.

Assumption of Port Elgin lights.

Since 1884, the municipality had maintained lights in Port Elgin Harbour, Lake Huron, and on the opening of navigation last year the maintenance of the two pairs of range lights then in operation was assumed by the Government of Canada, and Mr. Robert M. Lowry, the lightkeeper, was maintained in charge at a salary of \$60 per annum.

Light on Hilton Wharf.—An arrangement was made last season by this department with Mr. S. T. Bowker, owner of the wharf at Hilton, on the north coast of St. Joseph Island, in St. Joseph Channel, district of Algoma, Ontario, by which he maintains for the purposes of navigation, a light upon the wharf.

The light is a fixed white light shown from a square lantern with glass reflector, suspended from a pole 60 feet back from the outer end of the wharf. It is elevated 25 feet above the level of the water and should be visible three miles from the approaches to the wharf.

A mechanical fog-horn, worked by hand, was also supplied, and is used in answer to signals from vessels.

Canadian Canal Sault Ste. Marie Lights.

The range lights referred to in last year's report to mark the dredged approaches to the new Canadian canal were duly established in position by the canal authorities, the expense of maintenance being borne by this department.

CONTENTS

	PAGE
Report submitted by Minister.....	1
Report of Deputy Minister.....	1

SUBJECTS EMBRACED IN DEPUTY MINISTER'S REPORT.

Buoys and Beacons.....	36
Correspondence.....	62
Coasting Trade of Canada.....	60
Dominion Steamers.....	38
Engineers' Certificates.....	56
Ice Boat Mail Service or Winter Mail Service.....	41
Inside Service Employees.....	58
Lighthouse Service.....	1
do Ontario Division.....	2
do Quebec Division.....	9
do Nova Scotia Division.....	14
do New Brunswick Division.....	21
do Prince Edward Island Division.....	31
do British Columbia Division.....	33
Longitude of Montreal.....	62
Live Stock, Inspection of.....	61
Maintaining Lighthouses and Dominion Steamers.....	38
Merchant Shipping.....	46
Masters' and Mates' Certificates.....	41
Meteorological Service.....	60
Magnetic Observatories.....	60
Messenger Pigeons.....	61
Oils for use of Lighthouses.....	37
Outside Service Employees (Marine Branch).....	59
Obstructions to Navigation, removal of.....	61
Registration of Shipping.....	46
Sick and Distressed Mariners.....	43
Steamboat Inspection.....	56
Wrecks and Casualties.....	43

APPENDICES

Chief Engineer's Report.....	66
Expenditure, Statement of, for 1895-96.....	63
Expenditure since Confederation.....	168
Hydrographic Work, Lake Erie.....	68
Live Stock Shipments.....	152
Life-boat Stations.....	172
Longitudes.....	129
Lighthouses, Stations, etc.....	181
Masters and Mates, Report of Chairman of Board of Examiners.....	137
Meteorological Service.....	116
Magnetic Observatories.....	125
Messenger Pigeon Service.....	140
Revenue Statement.....	65
Rewards for Humane Service.....	178
Steamboat Inspection, Report of Chairman.....	131
Signal Service.....	142
Sick Mariners' Dues.....	180
Tidal Service.....	70
Wharfs, Statement relating to.....	165

CHANGES AND IMPROVEMENTS AT EXISTING STATIONS.

Ste. Placide.—Approach to Ste. Placide, Lake of Two Mountains, Ottawa River, has always been difficult in consequence of the existence of a bar or shoal extending roughly parallel to the shore and about a mile distant therefrom. Through this shoal two channels, 80 to 100 feet wide have been dredged, one leading to the village wharf N. E. by E. $\frac{1}{4}$ E. from up stream, the other leading to the wharf N. W. from down stream.

Two range lights have since 1874 been maintained to mark the axis of the up-stream channel.

The front tower of this range has recently been moved to a new site at the point where the axes of the two channels intersect, a distance of 130 feet S. W. by W. $\frac{1}{4}$ W. from its former position. It now stands on the beach at the inner end of the wharf, on a cribwork block, and is 5 feet lower than in its old position, which makes the light 15 feet above the summer level of the lake. It is a fixed white light strengthened by a pressed glass lens. In other respects the old range of lights has not been changed.

In this front tower an additional light was arranged to mark the down-stream cut. It is a fixed catoptric light elevated 15 feet above the water, and visible two miles, showing a narrow bright or white beam of light in the channel, with a red sector on the upper, or port, side of the channel in entering, and a green sector on the starboard side. To enter and keep the channel, a vessel must get the white light open its full brilliancy, bearing N. W. and steer directly for it, keeping the bright light open.

To mark this lower cut in daytime a day beacon, consisting of a mast carrying a slatted diamond-shaped target is erected on top of the bank, east of the parish church, 340 feet N. W. from the front tower. It is painted white with a black diamond in the middle of the slatwork. The front tower and beacon in one N. W. are in the alignment of the outer end of the lower dredged channel.

The cost of these changes was \$100.26.

Arnprior Island.—The mast from which a light was shown on an islet opposite the town of Arnprior, Chats Lake, Upper Ottawa River, has been replaced by a new mast 10 feet higher than the old one, and the pressed lens lantern has been replaced by a 7th order dioptric lantern.

The colour of the light has also been changed from white to red. The light in future will be fixed *red*, elevated 40 feet above the ordinary level of the water, and should be visible 8 miles from all points of approach by water.

The light was raised so that it could be visible over an intervening point up the lake, and was changed in colour to distinguish it from the lights in the town of Arnprior. The cost of raising the mast was \$40.31 and the new lantern is worth \$98.

Kingston Harbour Buoys.—On the opening of navigation in 1896 the three platform buoys previously maintained on Penitentiary shoal, Myles shoal and Bolivia shoal respectively, in Kingston Harbour, Lake Ontario, were replaced by wooden spar buoys surmounted by slat work globes or spheres.

The buoys are painted as heretofore, viz., in red and black bands, and are moored as near the middle of the shoals as possible, in 12 to 14 feet water. Vessels should give the buoys a good berth as the shoals extend some distance.

This change in the form of the buoys was made in consequence of complaints that large and heavy platform buoys would have proved dangerous if struck by light draught vessels. During the summer the position of the buoys on the harbour shoals was surveyed and the result of the survey forwarded to the Hydrographer of the Admiralty for insertion in the official charts.

Port Dalhousie.—In response to requests from owners of steamers entering Port Dalhousie a large bell, furnished by the Lakeside Navigation Company, has been attached to the platform to the range light tower near the outer end of the East pier and is rung by hand by the light keeper as a fog signal in reply to fog signals from vessels desiring to make the canal. This bell replaces the less powerful hand fog-horn previously used for the same purpose.

Western Islands.—In accordance with the intention expressed in last year's report the temporary illuminating apparatus of the new lighthouse on Western Islands was replaced on the 12th of October last by a 4th order dioptric apparatus procured from Messrs. Chance Brothers & Co., Birmingham. The light shown from it is a fixed bright light varied by bright flashes at intervals of 30 seconds. It should be visible 14 miles. The installation was made by Mr. W. H. Noble, foreman of works, who also erected at the station a boathouse, a derrick for landing supplies, and a platform extending from the landing to the several buildings, all designed to resist the action of waves. The cost of the illuminating apparatus was \$1,399.10 and of the improvements made by Mr. Noble \$507.79.

Bamford Island.—A mechanical fog-horn, to be worked by hand, has been supplied to the light station at Bamford Island, St. Joseph Channel, and will be used to answer signals made by vessels.

Rains Wharf Range.—Prior to the opening of navigation in 1896 the masts from which the range lights at Rains wharf, in the River St. Mary, Ont., are exhibited, were moved to an alignment about 80 feet northward of the old alignment, so that they might be in the same alignment as the American range lights at Point of Woods, and mark the axis of the channel which was widened by the United States government.

The front range light now stands on the shore north of Rains wharf. The lantern is elevated 21 feet above water.

The rear light mast stands 436 feet S.E. $\frac{1}{4}$ E. from the front light. The lantern is elevated 26 feet above water.

In other respects the range is unchanged, and the two lights in one guide through Dark Hole Passage as before.

PRINCIPAL REPAIRS TO EXISTING AIDS.

Pointe Claire.—The lighthouse on the pier at Pointe Claire was destroyed by fire on the 14th Nov., 1895, from sparks from a passing steamer which got under the sills of the building. Fortunately the cribwork foundation had the previous year been replaced by a concrete pier and remained almost intact. A temporary light

has since been maintained on the pier. The pier has been thoroughly repaired and a new tower will be built upon it ready for navigation in the spring of 1897. The work has been put in charge of Mr. W. H. Noble, foreman of works.

L'Orignal.—The lighthouse at L'Orignal, on the Ottawa River, which was an open-framed structure built in 1871, was blown down in 1893, and since that time a mast-light has been maintained. This mast-light not being sufficiently powerful or reliable to give satisfaction, the department proposed to replace it by a light shown from an inclosed tower and invited tenders for the necessary building in September, 1896. The lowest tender received was \$799, and this being considerably above the Chief Engineer's estimate, the department now intend to erect the building before the opening of navigation next year, by day's labour, under the superintendence of Mr. W. H. Noble, foreman of works.

Gibraltar Point.—The small vertical boiler used to operate the steam fog-horn at Gibraltar Point station since 1886, being in bad order, was replaced last year by a larger horizontal boiler manufactured by Messrs. Carrier, Lainé & Co., of Lévis, under contract, for \$400. The boiler was erected under the superintendence of Mr. W. H. Noble, foreman of works, and it was necessary to enlarge the engine room in consequence of the difference between its size and that of the old boiler. At the same time, the old fog bell building which had not been used for some years, was removed and some repairs made to the verandah of the dwelling, the whole work costing \$276.81. The stone work of the lighthouse was pointed and whitewashed under contract by Mr. R. Clayton of Toronto, at a cost of \$90.00. The old displaced boiler was sold on the ground to the highest tenderer, for \$36.00.

Port Dalhousie.—During the coming season the Department of Railways and Canals proposes to remove the decayed cribwork top of the East pier at Port Dalhousie, and to replace the portion above water by concrete. They have asked this department to replace the timber block on which the outer range light stands by a similar substantial foundation and steps have been taken to have this work completed ready for the pier work before the opening of navigation next season.

Cove Island and Mississauga Strait Fog-alarms.—For the purpose of duplicating the fog-alarm machinery at Cove Island and Mississauga Strait stations, new boilers have been made under contract by John Inglis & Sons of Toronto, delivered at the stations at a cost of \$1,990. These will be placed in position next year.

Lone Rock Bell Buoy.—The large ballast ball used on Lone Rock bell buoy was found to have become detached when the buoy was raised for the winter and a new ballast ball has been applied and the buoy repaired.

Corbay Point.—The lighthouse on Corbay Point, Batchewana Bay, Lake Superior, was extensively repaired, the tower, the roof and the walls of the dwelling having been shingled and the building generally overhauled, at a cost of \$484.53. This work was done under the supervision of Mr. Noble, foreman of works.

Lamb Island.—The lighthouse and keeper's dwelling on Lamb Island, Lake Superior, built in 1877, was found to be in a bad state of repair mainly in consequence of leakage through the outside covering, and was practically rebuilt during the past summer, under the supervision of Mr. Noble. The cost of this work was \$818.46, being sensibly increased in consequence of the difficulty of transporting materials to the site and the scarcity of workmen in the locality.

Rainy River.—The range lights established at the mouth of Rainy River, as described in last year's report, proved of great assistance in the navigation of the Lake of the Woods, but the pile foundations were found to be unsatisfactory, especially for resisting the shove of ice which occurred in the spring. It has therefore been decided to replace the pile foundations by cribwork piers filled with ballast and the work will be done by contract.

QUEBEC LIGHTHOUSE DIVISION.

The Quebec division extends from Montreal to the end of the Straits of Belle Isle, covering a coast and river service of over 1,200 miles, comprising all the lighthouses in the Richelieu River, Lake Memphremagog, as also all the lighthouses, lightships, gas buoys, and beacons from Montreal to Quebec; and below Quebec, all lighthouses, lightships, gas buoys, wooden buoys, beacons and fog alarms in the River St. Lawrence, Saguenay River, Baie des Chaleurs, Gulf of St. Lawrence, Straits of Belle Isle, north and west coast of Newfoundland and Labrador. This division is under the control of J. U. Gregory, agent of the Department of Marine and Fisheries at Quebec.

The agent attends to any other duties required by the department for the Marine and Fisheries at Quebec, and is also shipping master, attends to the requirements of the British Board of Trade in connection with shipwrecks and distressed seamen, casualties at sea, and is receiver of wrecks and supervisor of wharfingers in the province of Quebec; as also a fisheries officer for that province.

The agent's staff at Quebec consists of Mr. L. A. Blanchet, chief clerk and accountant, also deputy shipping master; Mr. Alphonse Hamel, clerk; Mr. N. Fitzhenry, storekeeper, and Mr. G. D. O'Farrell, lighthouse inspector.

The workshops, in which are employed reliable and skilled workmen, are under Mr. Ernest Roy, master carpenter, and Mr. G. Vezina, master shipsmith, and the gas works are under Mr. G. Belanger, with such assistance as may be required from time to time.

The steamer at the disposal of this agency during the past year was the "Druid" which supplied lights between Quebec and Father Point, and attended to gas and other buoys, as well as beacon service below Quebec. The steamer "Aberdeen" came from Halifax to supply the lights below Father Point, in the Gulf of St. Lawrence, Strait of Belle Isle, Anticosti, Magdalen Islands and Baie des Chaleurs. The service between Quebec and Montreal was by passenger boats, hired tugs or by rail.

There are in this division 154 lights at 117 stations; 8 lightships, 3 of which are supplied with powerful steam fog whistles; 9 explosive bomb signal stations in connection with lights; 2 steam fog-whistles and 9 steam fog-horns; 10 gas buoys, 4 of which are supplied with bells; 140 wooden buoys not under contract, and 59 day beacons.

IMPROVEMENTS TO LIGHTS.

Isle aux Prunes.—On the opening of navigation in the spring of 1896, the wooden lighthouse tower formerly used at Isle aux Prunes light station, was replaced by a skeleton steel structure, square in plan, with sloping sides, surmounted by a

square galvanized iron lantern. The vane on the lantern is elevated 31 feet above the deck of the timber work pier to which the building is bolted.

Both framework and lantern are painted red. The tower is made most conspicuous as a day mark by having a target of wooden slats attached to the upper half of the down-stream face. This target is painted white on both the up and down stream faces. No change has been made in the height or character of the light.

Lavaltrie.—A similar steel tower was at the same time erected in place of the old wooden tower from which the back range light at Lavaltrie was displayed.

The framework and lantern are painted red, and the wooden slatwork target is painted white, with a vertical red stripe down its middle.

The height and character of the light are unchanged.

PRINCIPAL REPAIRS AT EXISTING STATIONS.

The following is a statement of the more extensive repairs and improvements made at the several stations during the past year. In addition to those mentioned, ordinary repairs were made, supplies kept up, and painting done wherever required.

Amherst Island.—The extensive repairs begun at this station, as stated in the previous annual report, were carried out and a new oil shed was also built. The work was done by carpenters sent from Quebec—and the station is now in very good order. The total cost amounted to \$592.76.

Anticosti, Heath Point.—The lower portion of the tower, lantern gallery and windows had their clapboarding repaired, as also the refuge for the shipwrecked, and the store-house and barn also received attention. All the repairs were performed by workmen sent from Quebec. All the necessary painting was, however, done by the keeper with local assistance, the department supplying all material.

Anticosti, South Point.—The tower at this station, which leaked all over, has been made staunch, and the plaster of the ceiling which was falling off has been repaired. Forty-five feet of the breakwater in front of the buildings had its planking renewed and the back filled with stone. The fog-horn building which was opening in the centre on the top, had its stone foundation facing the beach raised and the roof repaired. The whole work was performed by mechanics sent from Quebec. The total cost of the repairs at this station amounted to \$353.50.

Anticosti, West Point.—Repairs were carried out to the stone and wooden breakwaters, and a small extension built to the latter. The tower and dwelling also repaired. The whole of the work was carried out by workmen sent from Quebec at a total cost of \$1,215.80.

Belle Isle.—A new landing place was built at this station and necessary repairs made to the buildings, at a total cost of \$589.13. The men and material had been sent from Quebec by the supply steamer.

Cape Salmon.—A portion of the landing slip at this station having been carried away by a storm, men and material were sent from Quebec to make the repairs, and the work was attended to satisfactorily. A boat shelter was also provided at this station. The total cost of repairs amounted to \$214.10.

Cape Charles.—The back light at this station was much improved by the erection of a higher pole, thus raising the lantern 10 feet. A locomotive headlight lantern sent from the stores of the agency at Quebec was substituted for the one formerly in use. The small building at the base of the pole was enlarged. The front tower also received some repairs.

Cape Despair.—A new chimney top was put on by local workmen at a cost of \$8.00.

Cape Gaspé.—The chimney on the north-east side of the lighthouse formed an obstruction to the light seaward, and was consequently taken down and rebuilt on the landward side of the building. The chimney was built by local workmen at a total cost of \$187.15. Repairs were also made to the fence around the government property, at a cost of \$6.00, the work being done by the keeper with local assistance.

Cape Norman.—This station being without a duplicate foghorn, a boiler was sent down from Quebec as a spare one in case of accident.

Contrecoeur.—The front tower which was carried away by the ice on the 19th April and landed in the middle of a field some 500 feet distant, was found not to have been much damaged and was therefore replaced in position. It was repaired, and the platform was renewed. Slight repairs were also made to the metal roof and the tower was painted by the keeper with local assistance. A new ventilator was also put in the back tower. The total expenditure incurred at this station was \$64.61.

Egg Island.—The gallery around the lantern was renewed. The chimney was also repaired, 200 fire-bricks having been sent from Quebec for that purpose, and a new chimney top was supplied. The work was done by local workmen under the supervision of the keeper.

Ile à la Pierre.—The light-house on a cribwork pier at this station was carried away by the unusually heavy ice-shove of last spring. As the pier had reached the limit of the life of a wooden pier, and as the lighthouse was in need of extensive repairs the loss by the accident was inconsiderable. During the season of navigation a temporary pole light was maintained and a new pier and lighthouse are now being built by Mr. W. H. Noble. The wooden pier is being replaced by a concrete monolith in a cylindrical steel casing.

Forteau.—Extensive repairs are required at this station and two workmen sent from Quebec are engaged in making new floors, &c., and erecting a new coal shed to hold 100 tons. The sum of \$234.19 has been spent for lumber and other materials.

Lark Islet.—The horizontal boilers at this station being in need of repairs a boiler maker was sent from Quebec. Some old and defective valves were replaced and other steam connections renewed. An iron tank for an additional water supply for the fog alarm was sent down by the supply steamer. The tower was painted by the keeper with local assistance, and small repairs made to the boat. The amount expended on these repairs was \$36.90.

L'Islet Richelieu.—Considerable damage was done at this station by the ice in the spring. The coal oil shed was completely carried away even to its stone foundation, as well as the door steps and small platform. In view of the fact that the Department of Public Works are dredging Barre à Boulard to the uniform depth of the ship channel and that the new channel will necessitate a removal of this

light, a temporary oil shed was erected, which can be taken down in the fall and stored on the mainland. The cost of this work amounted to \$45.60.

Lower Traverse Lightship.—This lightship underwent repairs, the cost of which with the general outfitting amounted to \$481.61.

Maquereau Point.—The foundation of the tower, which was in bad order was repaired by a local mason. Two rooms were ceiled, and the flooring in kitchen and passage way was renewed. This work was also done by local assistance at a total cost of \$70.90.

The Pillars.—The breakwater built at this station last year was completed by the keeper. Owing to the action of the sea, a displacement of the stone portion took place, and the keeper was obliged to change the plan of the wharf, and build it further in the gully where he keeps his boat. The landing slip, the lower end of which was broken by the ice last spring, and the platform and steps were also put in good repairs. Some changes having been made in the revolving apparatus, to give increase in speed, the machinery proved too weak for the heavy weights necessary for rapid revolving and the light stopped revolving. A machinist was sent down from Quebec several times to remedy the trouble, and after considerable difficulty, the gearing was put in good working order.

The total cost of the repairs effected at this station was \$531.28.

Pointe aux Citrouilles.—Considerable damage was done to the lighthouse last spring. The tower and part of the pier were carried several acres. The oil shed had to be renewed and a temporary pole erected at a cost of \$41.96.

The lighthouse tower has been brought back to its old position on the pier, and now shows a light similar in all respects to that shown before the tower was displaced.

Point Rich.—The storehouse and barn being in very bad order, a new one is to be erected. The building was made in Quebec, ready to be put together at the station by the keeper. An expenditure of \$108.46 has been incurred so far for lumber.

Red Island Lightship.—The boiler and machinery of this vessel were thoroughly repaired last winter. Leaks at the bottom seams and in bottom of furnace were stopped and a one-inch injector fitted in. The repairs as well as the general outfitting in the spring cost \$725.05.

Richelieu River lights.—The stations at Ash Island, Lacolle, and north of Halfway Point were visited by Mr. Noble this autumn, and the buildings, which required repairs, were put in good order.

Upper Traverse Lightship.—This vessel was docked during last winter and thoroughly caulked. Other repairs were also carried out, which, including general spring outfitting, amounted to the sum of \$493.40.

White Island Reef Lightship.—This vessel was docked last fall to have her bottom scraped and painted. The boiler and machinery were also extensively repaired. The side valve of operating engine, the valve chest on steam cylinder of donkey pump and three globe valves were renewed, and a new whistle pipe also put in. The total cost of repairs and docking amounted to the sum of \$1,599.85.

FOG ALARMS, STEAM WHISTLES, COMPRESSED AIR HORNS, AND GUN COTTON
EXPLOSIVE BOMBS AND CARTRIDGES.

This very important part of the service is much interfered with by atmospheric influences in all weather, especially in a dead calm when fogs are the most dense.

Enquiry into complaints against fog alarms not being properly attended to have thus far resulted in establishing that there had been neither neglect nor incompetency on the part of the operators, but the defect was owing to the sound not being distinguished on account of atmospheric influences, even when vessels were but a comparatively short distance away.

BUOY SERVICE.

Gas Buoys.

The Quebec district has in operation 10 gas buoys, 4 of which are supplied with bells operated by four hammers put in motion by the action of the waters. Each of these buoys has the name of its respective station painted on its side.

There are two spare spherical gas buoys on the Queen's Wharf at Quebec, where are also situated the gas works, supply tanks, &c.

The total cost of this service for last year amounted to \$2,769.33.

Wooden, Can and Spar Buoys and Beacons.

The buoy and beacon service under the Quebec Agency comprises all those situated in the River Richelieu, Saguenay, St. Lawrence, Baie des Chaleurs, Gaspé Coast and Magdalen Islands harbours.

The buoys in the ship channel between Quebec and Montreal are maintained under a contract with the Sincennes-McNaughton Line.

Some improvements in the disposition of the buoys, to suit increased widths, etc., were made as required.

The total cost of this extensive service, including contracts for the wintering, repairing, replacing, taking up and renewing buoys and beacons, for the last fiscal year, was \$3,502.69, not including the buoys between Quebec and Montreal.

The usual number of buoys and beacons were repaired, painted and renewed.

Spar Buoys.

The eight spar buoys to enable belated vessels to pass the eight principal points outwards and inwards below Quebec were built as usual and placed in position after all other buoys had been taken away for the winter.

These buoys have now become a necessity and are much appreciated by navigators.

NOVA SCOTIA LIGHTHOUSE DIVISION.

This division, in charge of Mr. J. Parsons, agent of the department for the province, comprises 180 lighthouses, exhibiting 192 lights, 1 light vessel, 16 steam fog alarms; 1 signal bomb station; 20 hand fog horns; 2 fog bells; 17 automatic whistling buoys; 13 automatic bell buoys; 101 iron can buoys; about 700 spar and other small buoys; 8 stationary beacons; 16 life-saving stations; 3 humane establishments and 4 signal stations. The steamers "Newfield" and "Aberdeen" are also under the control of this agency.

The light and fog alarm stations have been inspected by Mr. C. H. Hutchins, superintendent of Lights; the boilers and machinery at the fog alarm stations, for the most part by Mr. D. Stevens, inspector of government steamboats, and the life-saving stations by Mr. Alfred Oden.

CHANGES AND ALTERATIONS.

Glasgow Point.

A small tower, with keeper's dwelling attached, has been erected at Glasgow Point to take the place of the inferior pole light hitherto in operation at that station. An acre of land has been acquired and enclosed with a wire paling fence.

The new tower is erected on the site of the old light mast, on the north and west extremity of the Point, on ground about 39 feet above high water mark. It is a square wooden building, painted white, surmounted by a hexagonal iron lantern painted red, and attached to its south side is a small white wooden dwelling. The height of the tower, from its base to the vane on the lantern, is 32 feet.

The light is fixed red, elevated 65 feet above high water mark and should be visible 8 miles from all points of approach by water. The illuminating apparatus is dioptric, of the 7th order. Materials were sent by the "Aberdeen" and the work done by Mr. John Chisholm, foreman of works, with local help at a cost of \$1,374.38, including \$246.79 for iron lantern and \$91.74 for illuminating apparatus.

Point Tupper.—The tower has been extended ten feet in height in order to clear obstructions to light on southerly bearings by the railway buildings on the point. The tower was secured by four wire rope guys. Materials were procured locally and the work done under the superintendence of Mr. McLellan, who employed local help.

Cheticamp.—A new tower was constructed on the north side of dwelling. This was necessitated by the insecure nature of the building on which the lantern was erected. Materials were sent by the "Aberdeen" and the work done by Mr. John Chisholm, who employed local workmen.

Westhaver Island Light.—The light on Westhaver Island, at the entrance to Mahone Harbour, Mahone Bay, Atlantic Coast of Nova Scotia, was improved by the substitution for the mast formerly maintained, a more powerful light in an enclosed tower.

The new tower is erected on the summit of the island, near its south-east end, on a site about 30 feet above high water mark. It is a square wooden building painted white, surmounted by a hexagonal iron lantern painted red, and attached to its North-

west side is a small white wooden dwelling. The height of the tower from its base to the vane on the lantern is 27 feet.

The light is a fixed white light elevated 54 feet above high water mark, and visible 12 miles from all points of approach. The illuminating apparatus is dioptric of the seventh order.

The change from the mast to the tower was made on the 15th January, 1896, when the mast was removed.

Pictou Range Lights.—It was decided to replace the unsatisfactory mast lights at Fraser's Farm, entrance to Pictou Harbour, by more powerful lights shown from enclosed towers, and plans and specifications were prepared and tenders invited for the work. Only one tender was received amounting to \$826. On the recommendation of the Chief Engineer this tender was not accepted, but the two buildings were erected under the superintendence of Mr. John Chisholm, foreman of works for the Agency, who purchased materials locally and employed local labour. The total cost of the two towers was \$660.22.

The tower in each case is a square wooden building with inclined sides, surmounted by a square wooden lantern, the whole painted white. The front range tower stands immediately behind the site of the old front mast, 600 feet back from the shore, on ground 49 feet above high water mark, and is 30 feet high from its base to the vane on the lantern.

The light shown from it is a fixed red catoptric light, elevated 66 feet above high water mark, and should be visible 8 miles in, and over a small arc on each side of, the line of range.

The back tower, which stands on land 46 feet above high water mark, 384 feet N. W. by W. $\frac{1}{4}$ W. from the front light, is 38 feet high. From it is shown a fixed red catoptric light elevated 78 feet above high water mark and visible 8 miles in, and over a small arc on each side of, the line of range.

The two lights in range are to be used as heretofore, but are more powerful and reliable than the former lights.

Removal of Abbot Harbour Light.—In consequence of representations from the fishermen interested, it is intended to remove the pole light on the south extremity of Abbot Island early in 1897 to a new site on the main land about $\frac{1}{2}$ mile east of its present position, and at the entrance from the southward to the harbour, and also to extend the time during which the light will be kept in operation to cover the whole fishing and lobster seasons. It is thought that in its new position a more certain attendance will be secured.

Improvement in Carter Island Light.—On the 7th December 1896, the light shown from the lighthouse in Carter Island, in Lockeport Harbour, was improved by replacing the catoptric apparatus formerly used and replacing it by a seventh order dioptric apparatus manufactured by Messrs. Chance Bros. & Co., of Birmingham. The light remains as heretofore a fixed red light elevated 66 feet above high water mark and should be visible eight miles from all points of approach by water.

Additional light on Grand Narrows bridge.

When the swing of the railway bridge over Grand Narrows, Cape Breton, was marked by lights and a new lighthouse established on Gillis Point, it was considered that the lighthouse heretofore maintained at Iona, at the east end of the bridge, was superfluous, and the light was accordingly extinguished. Complaints having been made by mariners that the red and green lights on the bridge swing were not sufficiently conspicuous to lead to the passage in bad weather an additional fixed white light is now exhibited by the railways management, from a lens lantern, hoisted on an iron frame directly over the red and green lights. This light should be visible 7 miles from all points of approach by water.

REPAIRS AND IMPROVEMENTS.

The following repairs and improvements, in addition to ordinary and small repairs and painting, have been made to various stations, viz.:—

EAST OF HALIFAX.

George Island.—Eight new lamps were furnished and a new boat supplied.

Meagher's Beach.—The walls of room in keeper's dwelling were sheathed, a new floor was laid, a new sink and dresser fitted in kitchen, and the building painted.

Point Tupper.—In addition to increasing the height of the tower as already described, the keeper's dwelling was stripped of old clapboards and shingled. The sills and floors of porch and kitchen were renewed, and new stairs were built and part of a room was lined. New storm doors to porch and cellar, new roof on passage way from dwelling to tower. The barn had its sills, joists and floors renewed and the roof was re-shingled. The work was all done under Mr. McLellan, the foreman carpenter, who employed local help and procured the materials locally.

Petit De Grat.—A new cribwork landing slip was constructed at this station, and new sills placed under the lantern. A new floor was laid in kitchen, and minor repairs done to sill and the outside of building.

Louisburg.—Two new lamp fountains were supplied, the cellar wall pointed and the plaster in two rooms was repaired.

Scattarie.—The kitchen porch was re-shingled, two new doors fitted to dwelling and thirteen storm sashes furnished.

Point Aconi.—The breakwater of landing was repaired.

Amet Island.—New blocks and fall were supplied for capstan. The kitchen floor was re-covered, the chimney was rebuilt from roof and the boat slip was repaired.

Pugwash.—A well was bored to supply fresh water.

St. Paul's Island.—A new surf boat was supplied to main station and a small boat to the S. W. Lights. Three new spouts were placed to superintendent's dwelling.

WEST OF HALIFAX.

Sambro.—Materials were landed to repair keeper's dwelling. Four broken panes of glass in lantern were replaced and all the other panes re-gazed. One beam and

part of floor in lantern, one sill under old whistle house were removed and old clapboards removed and west end of building shingled. The chimney of dwelling was taken down to roof and rebuilt.

Dover Harbour.—A new boathouse has been built at landing under contract by Mr. Martin Fader, of Shad Bay, for \$100. New boat furnished and two ladders for painting buildings.

Croucher's Island.—The landing slip was recovered with plank, and new hinges and a latch were fitted to boathouse doors.

Quaker Island.—The foundation walls were pointed, and 60 ft. of earthen pipe supplied for drain from cellar.

West Ironbound.—A new Chanteloup clock has been set up in place of the old worn one which was taken down and brought off for repairs. New iron blocks for weight chain were supplied, as also four copper smoke pipes, and two lamps were repaired. A new sill was fitted under west end of store.

La Have.—A cribwork protection wall has been built along the face of bank in front of lighthouse to prevent encroachment of the sea. The structure is 100 feet long, 6 feet wide and 3 logs high, and the work was done under contract. A new floor was laid in cellar.

Port Mouton.—The cellar floor was concreted, and a new drain pipe laid from cellar. The foundation walls were repaired, as also the platform, and new steps fitted to entrance.

Barrington Lightship.—The vessel was taken off her station and hauled ashore to have her bottom cleaned and painted, and top sides and deck caulked. A new boat and a caboose stove were supplied. A new bolt to pump was furnished. A small schooner was hired to take her place while off the station.

Bon Portage.—New sills were placed under the oil store, and new doors to cellar and lock to store at landing.

Fish Island.—The oil store was shingled on four sides, and side of roof was re-shingled. An addition for kitchen 18 x 15 feet has been built on east side of dwelling.

Sissiboo.—Four sills, part of studs, one beam and part of two corner posts were renewed; two sides of tower were reboarded, old clapboards stripped off and shingled all over. New steps were placed to entrance door, and one broken pane of glass in lantern was replaced. The foundation wall was repaired and the building painted. The work was done under Mr. McLellan, who employed local help.

Isle Haute.—Twenty dollars were expended in repairing roof from landing to lighthouse. The plaster in rooms was repaired and the cistern in cellar re-coated with cement.

Kingsport.—Two of the wooden corner posts of lantern, which obstructed the light seaward, were removed and replaced with iron, which also changed the size of glass to larger dimensions. The glass panels in entrance door were replaced.

Hand fog-horns have been placed at the following additional light stations in this agency, viz.: Canso Harbour, Marache Point, Arichat, Jerseyman Island, Quaker Island, and will be sounded by the keepers during thick and foggy weather, in answer to signals from vessels.

FOG-ALARMS.

Mauger's Beach.—The exhaust pipe box was repaired and refitted and the water conductors around tower were repaired.

Scattarie.—A new boiler was placed in the whistle house, the old one having been condemned. The old corrugated galvanized iron roofing has been stripped off, and the roof recovered with McAvity's spark proof felt. The walls of building were stripped of clapboard and shingled. The engine room was lined with 3 inch spruce sheathing and the floor concreted. A new time-piece was supplied to the engine room, and the conductors and spouts leading to cistern renewed.

Cranberry Head.—The boiler was retubed.

St. Paul's Island.—The old boiler being considered unreliable, a new one is in course of construction by Messrs. Matheson of New Glasgow, under contract for \$952.00. When finished it will be sent to the station and set up alongside the old one; the latter will then undergo repairs and be used as a duplicate. New brasses were fitted to crank shaft and a new pipe to reservoir.

Cape Race.—200 new tubes were supplied for boiler and a new set of furnace bars. The old Crosby automatic machine has been brought off and a new one set up in its place.

Chebucto Head.—The seams and legs of the boiler were caulked and cement placed around legs inside. New steam pipe was fitted to connect both boilers with the Crosby machine. Two new globe valves were fitted.

Seal Island.—Guy rods were fitted to plates in coal shed to prevent building from spreading.

Yarmouth.—Set of grate bars furnished and new pipe fitted to injector. New whistle pipes fitted to change position of whistle.

Brier Island.—On the 28th March last, the old whistle house was completely destroyed by fire, which was probably originated by the fire under furnace coming in contact with the wooden beams of floor. The boiler was damaged, fittings nearly all destroyed and the donkey pump rendered useless. Immediate steps were taken to re-erect the old boiler, and a temporary shed was erected and the alarm put in operation again on the 1st day of May. It has been determined to make this important station first-class in every respect. Plans and specifications have been prepared for a new building, and a new boiler is being built by Messrs. Matheson, of New Glasgow. When ready, the new boiler will be sent to the station and set up alongside the old one, so that in future, there will be no occasion to stop operations, pending repairs. It is proposed to erect the new building by day's labour during the coming season.

Cape D'Or.—The new boiler sent last year has been put in position and is now in use.

Sable Island.—The telephone was put in good repair during July and August, mostly by the labour of the staff.

The locusts on the island devoured much of the vegetation, and 50 tons of hay was sent to the stations in the autumn to carry over the cattle and the wild ponies through the winter.

In the spring only four ponies were reported as having died since the autumn.

The six pony shelters built in localities where the ponies are likely to congregate in stormy weather are great protection—the racks at these shelters are kept supplied with hay.

Wild horses.—One hundred and sixteen ponies were shipped off the island and sold at Halifax.

Cranberries.—Only two or three barrels gathered and brought to Halifax.

The Chief Signal Station.

At Halifax Citadel and Camperdown.—At the latter place a new signal staff was erected larger than the old one, and with better appliances. Some repairs to the staff and yards at the citadel and the usual quantity of bunting for new flags constitute our chief expenditure.

The old code of signals has been changed and greatly simplified by Captain H. V. Kent, R.E., Superintendent of Signals.

This new code has been printed and a lithograph of the chart made which shows the signals for warships, mail and other steamboats, government ships entering Halifax Harbour, as well as for sailing vessels of all grades both by day and by night. A classified return of ships signalled at Halifax for the year shows 2,230 as against 2,078 for the preceding twelve months, a gain of 152.

Beacons in Atlantic Cove, St. Paul's Island.

A tidal gauge house, painted white, erected about 40 feet above high water mark in the bight of Atlantic Cove, St. Paul's Island, in the entrance to the Gulf of St. Lawrence, now forms a conspicuous land mark on the coast of the island.

A circular white beacon has been placed on the side of the hill above the gauge; these two objects in line, bearing N. W. $\frac{1}{4}$ N. lead clear to the southward of "Big Dick," a dangerous detached rock on which the sea breaks very heavily off the north-east horn of the cove.

The above alignment affords a good guide to vessels anchoring off the cove in 15 fathoms.

BUOY SERVICE.

Additional Buoys.

A spar buoy painted white, to be maintained throughout each season of navigation, was placed on the eastern extremity of the shoal near the government wharf that exists in the cove between Cossett Point and McAdam Point on the north side of East Bay, Big Bras d'Or Lake, in the county of Cape Breton, to render the approach to the wharf safer.

A wooden spar-buoy was established to mark the western extremity of the one-fathom patch between Cossett Point and McAdam Point, on the north side of East Bay, Big Bras d'Or Lake.

This buoy, which is painted red, will be maintained throughout each season of navigation.

A wooden spar-buoy painted black is moored in five fathoms water, on the eastern edge of Purcell Cove Shoal, which lies on the western side of the entrance to the North-west Arm, Halifax Harbour.

A red iron can-buoy was on the 13th May last established on the south side of Pollock Shoal, lying south of Point Enragé, in the county of Lunenburg, on the southern coast of Nova Scotia, and is moored in 7 fathoms water about $\frac{3}{4}$ mile south of the extremity of Point Enragé.

The red spar-buoy heretofore marking the eastern extremity of "The Bar" or shoal extending about $2\frac{1}{2}$ miles easterly from Carey Point, on the northern side of the entrance to Great Bras d'Or, has been replaced by an iron can-buoy painted red.

A red wooden spar-buoy has been moored on the south edge of the shoal midway between the iron can-buoy and Carey Point light.

The black cask-buoy marking the position of the ballast ground off Tidnish, N. S., in Bay Verte, between the counties of Cumberland, N. S., and Westmoreland, N. B., was moored last spring in a new position, $\frac{1}{2}$ mile N.W. from the entrance channel to the ship railway dock, and any vessels discharging ballast in Tidnish Harbour must discharge it between the buoy described and Tidnish Head. No ballast is on any account to be discharged to the eastward of the buoy.

Four spar-buoys have been placed at intervals between Thrum Cap Shoal and the Eastern Passage, at a distance of 3,000 yards from the stop butts of the Government Rifle Range on McNab's Island, Halifax Harbour, to mark the extreme limits of the danger zone, owing to the annual target practice of the troops on the island. These spars were painted red and are surmounted by cross heads painted red and white.

On the 10th July, 1896, a number of submarine mines were laid off George's Island, Halifax Harbour, and the dangerous area was marked by buoys consisting of green barrels with the word "Torpedo" painted on them in white letters, and vessels were accordingly warned not to anchor or pass within the area so buoyed, and these buoys were to be left out until the 31st December, 1896.

It has been decided to reserve the area containing these mines permanently for submarine mining purposes, and it is not to be encroached on by vessels.

An iron can-buoy painted black with "Point Aconi" in white letters on top, was established on Point Aconi Shoals, in the county of Victoria, on the eastern coast of the Island of Cape Breton, on the 15th July, 1896.

The buoy is moored in 7 fathoms water $\frac{3}{4}$ mile E. by N. $\frac{1}{2}$ N. from the extreme of Point Aconi.

St. John's Ledge bell-buoy, marking the ledge, near Pubnico, in the Bay of Chaleurs, which went adrift or sank at its moorings in April last, was replaced by a new buoy on the 2nd May last.

The automatic whistling-buoy maintained on the Lurcher Shoal, in the Bay of Fundy, off the coast of Yarmouth County, was incorrectly described in the Canadian List of Lights and Fog Signals. It is painted in red and black horizontal bands, with "Lurcher Shoal" in white letters. It is surmounted by a 10-inch whistle.

Roaring Bull Can Buoy.

The buoy was removed by the "Lansdowne," and replaced by another one in November, 1895, and also in May, 1896.

Trinity Ledge Bell Buoy.

This buoy was removed by the steamer "Lansdowne" in November, 1895, and also in June, 1896.

Yarmouth Buoys.

These buoys were looked after by the steamer "Lansdowne" and are removed twice a year. The buoys were out of position in April last, and were replaced in proper position by the "Aberdeen."

Blond Rock Automatic Buoy.

The buoy at this place broke from its moorings on or about the 22nd of November, 1895, and was picked up by the schooner "Speculator," Captain McDonald. Owing to the difficulty of holding a buoy at this place, for any length of time, it is lifted now every three months.

NEW BRUNSWICK LIGHTHOUSE DIVISION.

This division comprises all the lighthouses and other aids to navigation within the boundaries of this province, both on the Bay of Fundy and on the Gulf of St. Lawrence side. The large buoys maintained by the government on the Nova Scotia coast of the Bay of Fundy are also attended to by the steamer "Lansdowne" under the direction of the New Brunswick agent but are otherwise under the control of the Nova Scotia agent.

This division is under the charge of Mr. F. J. Harding, agent of the department at St. John, N.B., throughout this division.

The lights, &c., were inspected by Mr. John Kelly, inspector of lights.

There are in this agency, 120 lighthouses, 1 lightship and 12 steam fog alarms.

The number of keepers and engineers in connection with the lighthouses and fog-alarms is as follows:—86 lightkeepers, 7 lightkeepers and engineers of fog-alarms, 5 engineers and 5 assistant engineers—in all 103 persons.

NEW AIDS TO NAVIGATION AND IMPROVEMENTS IN EXISTING AIDS.

Green Head, St. John River.

A new lighthouse has been erected at Green Head, 24 feet east of the site formerly occupied by the old light on a mast, which is now discontinued.

The lighthouse is a white, square wooden building 50 feet high, situated 105 feet above high water mark. The illuminating apparatus is dioptric, the light being fixed white, elevated 150 feet above the surface of the water and visible 10 miles from all points of approach by water.

The work was done under contract by Mr. G. W. Palmer, the lowest bidder, his contract price being \$579.

Change in Lighthouse at Palmer's Landing.

A lighthouse tower was erected on the new government wharf at Palmer's Landing, on the River St. John, and the light put in operation on the 6th August, 1895.

The tower stands near the end of the pier, 1,200 feet north from the position of the temporary light on the old pier.

The tower is a white, square, wooden building, 28 feet high from the base to the vane on the lantern. The deck of the wharf is 13 feet above low water.

The illuminating apparatus is dioptric and the light is fixed white, elevated 34 feet above high water mark, and is visible 11 miles from all points of approach.

The work of erecting the new building was done under contract by Messrs G W. and B. R. Palmer, the lowest tenders being \$249.

A temporary light on the old wharf was discontinued when this light was put in operation.

Reed's Point Beacon Lights.

The luminant in the three lights shown from a lamp post on Reed's Point in the city of St. John, N.B., has been changed from gas to electricity. A 64-candle power incandescent lamp has been placed in each of the three street lanterns heretofore used. In case of any accident happening to the electric supply, illumination by gas will be temporarily resumed.

The lights have given good satisfaction since the change. The cost of maintaining these lights is \$115.00 per annum.

Shediac Harbour Range Lights.

The positions of the range lights on Pointe du Chêne wharf have been changed to suit a change in the channel, caused by recent dredging.

The front range light, mast and shed, have been moved from the position on the extremity of Point du Chêne North Railway wharf to the north-west corner of the government breakwater, a distance of 358 feet N. E. $\frac{3}{4}$ N. from the former position, and the back range light mast and shed on the extremity of the South Railway Wharf, moved 23 $\frac{1}{2}$ feet S. E. $\frac{1}{4}$ E., or at right angles to the line of range, from the former position.

The southern building was raised some 2 feet 6 inches, and the northern was raised about 3 feet, and a new foundation, as also an ice break, built to protect them from the ice flow.

Two new range lights were erected during the year, on lands owned by Jude Landry and Thaddy Gould, about a mile and a half from Point du Chêne Wharf towards Cape Brulé.

On vessels crossing the range of these new lights, it is safe to stand in towards the Shediac Island Beacons, to clear the Zephyr Rock, which was the object in placing them there.

The masts and sheds at the base were built by Dossity White, at a cost of \$63.

Change in Front Range Light at Neguac.—The front range light at Neguac wharf was removed from the mast and shed on the north-west of the old block at the outer end of the public wharf to a new mast and shed erected beside the roadway of the wharf 45 feet south-west from the old one.

The light is shown from a height of 25 feet above high water mark.

Range Light at Neguac Gully.

Owing to the shifting of the channel at Neguac Gully, it was found desirable to re-light the former front range light, which was discontinued in 1894, on the 28th October, 1896.

It is a fixed red light, hoisted on a mast, with a white shed at its base. The illuminating apparatus is catoptric.

The mast stands 900 feet south by west from the main light and the alignment guides to the buoy marking the crossing of the outer bar, also gives the middle of the channel and clears south and north bars.

Change in arrangement of Lights at North Tracadie Gully.

The channel over the bar at North Tracadie Gully which was indicated by range lights on the south side of the gully, made south last summer to such an extent that it was necessary to remove the range light to the north side of the channel.

The main light is now established in a cribwork block on a low sand flat about 1,200 feet inside the north beach and the front light mast and shed on piles 203 feet S. 41° E. from the main light. The two lights in one lead over the bar at the best crossing.

South Tracadie Gully.

The channel over the bar at South Tracadie Gully has been changed by the action of the sea and is about 300 feet south of its former position.

As the range lights could not be placed so that they would lead through the new channel, the outer range light has been extinguished and the fixed red light which was formerly the back range light continues to be maintained as a coast light.

The outer end of the government wharf at Hillsborough, on the Petitcodiac River, was so badly damaged that the small frame lighthouse tower upon it could no longer be used.

The fixed white light shown therefrom has in consequence been discontinued.

CHANGE IN COLOURS OF HARBOUR LIGHTS AT ST. JOHN.

On the 1st May, 1896, the beacon light on the point of the bar, on the west side of the channel in St. John Harbour, was changed from fixed white to fixed red, and the light on the end of the government breakwater at Negro Point was changed from fixed red to fixed white.

In other respects, the lights remained unaltered.

This change was made owing to the difficulty of distinguishing the beacon light from the electric lights about the city of St. John.

REPAIRS TO EXISTING STATIONS.

St. John Beacon Light.

The southern side of the roof of the dwelling was re-shingled; new lead placed in the angle of roof; a number of planks were also placed in the block and a few planks on the deck.

Beaver Harbour Light.

Two of the reflectors in use and two extra reflectors were re-silvered at this station at a cost of \$30. The lamps were repaired at a cost of \$30.

Repairs amounting to \$26.88 were also made during the year.

Big Duck Island Fog-alarm.

A new boiler was placed at this station in June last. It was made by Messrs. Carrier, Lainé & Co., at a cost of \$1,386.17. A new set of tubes was put in old boiler in January last.

A small addition was attached to dwelling house for keeper, 21 feet with 16 feet posts, pitched roof, shingled and plastered, two stories high, and containing 5 rooms, at a cost of \$400.

Bliss Island Light.

The lantern and deck were painted. The chimneys in dwelling were re-topped and one of the ceilings in dwelling plastered.

Cape Enragé Fog-alarm and Light.

The pump was repaired. A new roof has been put on north side of the barn, the same having been blown off in a heavy gale.

Cape Jourmain Light.

The clockwork has been repaired by Mr. Alfred Thériault, who was sent from Ottawa. The lantern was also painted.

Cassie's Point Light

The clockwork of revolving light has been repaired and all made good by Mr. Alfred Thériault.

Escuminac Light and Fog-alarm.

Considerable repairs were made to the tower, it having been found to be rotten.

Five pieces of timber 4 feet long, 14 inches square were placed in the tower, also two pieces of new sills, and the building was thoroughly painted.

The fog-alarm station was re-shingled and painted outside.

The barns and outhouses were re-shingled, thoroughly repaired and white-washed.

An iron pipe $2\frac{1}{2}$ inches was laid further up the marsh, some 120 feet, in order to make the supply to the reservoir more complete, the engineer doing most of the work.

Gannet Rock Light.

Two new ladders were placed on the western side, and a small blacksmith shop 17 feet square built.

The building for the electrical battery being found too small, it was enlarged four feet each way. The platform around the dwelling was also enlarged, by building an abutment 32 ft. by 27 ft. and planked over with two-inch spruce deals.

The dwelling had new floors laid, in two of the rooms the ceilings were sheathed and repairs made on two of the tower rooms.

The tramway was replanked and new railing was partly built around the platform. The stonework was pointed up, and all the buildings whitewashed.

Goose Lake Light.

The revolving apparatus was overhauled by Mr. A. Thériault of Ottawa. A new canvas deck was placed on lantern landing. A new floor was laid in dwelling. The yard and adjoining buildings were bushed to keep sand from blowing away and undermining the buildings.

Grand Harbour Light.

The stone walls of the building were found to be much decayed and broken and were repaired by Robert Bell, the cost for labour, three casks of cement being used in the repairs, was \$21.75.

Grand Manan Fog-alarm Station.

A new set of tubes was placed in large boiler. The reservoir at the fog station as also that at the dwelling house have been renewed with brick. The work was performed by Robert Bell, the cost of mason and helpers amounting to \$51.25.

A new wooden spout was placed around the dwelling.

Hay Island Light.

A new dwelling for the keeper has been erected at this station at a cost of \$100.49.

The building is 20 feet by 14 feet with 8 ft. posts and pitch roof. The work was done by the keeper.

Head Harbour Light and Fog-alarm.

The wooden tramway at the light station carried away by the storm last fall, was repaired by the keeper and his assistant, the labour costing \$10.00. The boathouse on the wharf was removed some 20 feet and placed in a more secure position. One tier of timber was placed on same and the planking renewed with two-inch spruce planks, and the stairs leading up to the same repaired.

The tramway at the fog-alarm station had for some 94 feet been carried away. The keeper and his assistant renewed it at a cost of \$10. The boathouse was carried away from the posts, and new posts had to be put in, as also one sill. The roof was shingled in part, and the old shingles renailed. The material for these repairs was on hand.

New timber and planking were laid on the wharf and breakwater, and new ballast placed therein to make them more substantial.

New tubes were placed in one of the boilers.

A new coal shed, 20 by 16 feet, with 12 ft. posts was built.

All the work at this station was performed by the keeper and his assistant.

Lightship "Jennie" Miramichi Bay.

This vessel was painted red from rail to water-line, and the inside of bulwarks painted white, as also the boat's masts. The house had two coats of white paint.

The bottom was scraped and caulked where necessary and then painted with copper paint. New water ways, fifty feet long were placed on the port side. Fifteen fathoms of chain was supplied and twenty fathoms of rope for lantern halyards. Four new lanterns were supplied the ship.

Machias Seal Island Light and Fog-alarm.

The old tramway made of 8 by 10 inch timber with cross pieces every 6 feet having been carried away during the winter, an iron tramway was built, 210 feet long, with a width of 5 feet 1 inch between the rails, and 42 clasps $5\frac{1}{2}$ inches wide rivetted with six $\frac{3}{8}$ bolts in each clasp, and bolts in rock of various sizes and lengths with eyes on end to receive the clasps. The whole cost of the work was \$558.41. The work was all done by day's work under the supervision of the inspector of lights. A blacksmith shop was built at the station 18 feet by 13 feet for doing the work.

The western lighthouse tower had two knees placed on inside of southern face, and a part of the floor was also renewed. The porch received new sills and floor.

The engine house had new sills placed under the door and cap. One of the reservoirs was deepened. The machinery was repaired, cleaned and painted. The dwelling was repaired and a new drain was laid from the dwelling to the bank. About 36 rods of new fencing was erected, and the barn was re-shingled. A new boat was also furnished at a cost of \$50.

Miscou Fog-alarm and Light.

The revolving apparatus was repaired by Mr. Thériault, of Ottawa.

One new sill was placed under the coal shed, and new blocking placed under the sills.

Partridge Island Light, Signal Station and Fog-alarm.

At the lighthouse a new floor of spruce planed boards was laid, and an oil rack and coal bin made.

At the signal station the old railing and platform around the flag staff was removed. A new platform 10 ft. long by 6 ft. wide and 7 ft. high above the ground was rebuilt, fastening it to sides of signal station with scantling and deal, and a board floor laid and a railing put around same.

At the dwelling a new floor of spruce planed boards was laid in kitchen and sheathing placed around the walls. Made a drain from kitchen sink to bank, and removed rock from side of roadway to allow team to pass. The whole cost including stock and labour, amounted to \$185.57.

At the fog-alarm, removed the railing on the top of the roof of the engine house, covered the hip of same with zinc 7 inches wide and 60 feet in length, repaired the lead flashings around steam pipe on roof leading to whistle, and new coverings to hatchway in roof of building, with the hanging of four new doors leading to the boiler room.

Built new shed 12 by 18 feet at opening of large door of boiler room.

A new boiler was placed this year by Messrs. D. McLachlan & Sons, boiler makers.

Removed the old covering and sides of the reservoir at the whistle house, and placed 6 new stringers 27 feet long 8 by 7 inches; removed the earth to receive the same on bank, and covered it with 2,000 feet of 3-inch spruce deal.

All the buildings were painted.

Passamaquoddy Bay Light.

The stairs at the landing having been carried away during last winter, new iron ladders were built 27 feet long 3 feet 1 inch wide, with iron sides 5½ inches thick, with steps in same to the first landing, securely bolted and fastened to the block; and then, proceeding to the upper landing, had an iron ladder from upper to lower landing. The deck was newly planked and a new railing placed around same. Iron hand-rails were placed on the ladders. The carpenter work was all done by the keeper.

The block trestle-work and all the rooms in the dwelling house were white-washed and two rooms papered.

Pea Point Light.

Two of the reflectors were re-silvered.

The cellar floor was cemented and a drain made from cellar.

Point Lepreau Fog-alarm.

The boilers and machinery have been thoroughly overhauled.

Pokemouche Light.

New sills were placed on the range light and the walk replanked, and a new railing placed on same.

Quaco fog alarm and light.

The roof of the dwelling house has been partly shingled and new lead laid in the gutter. The lead on the lantern has been raised and replaced partly with new lead.

The dwelling house and the lighthouse have been painted. The roof of the lantern was repaired at a cost of \$36.45.

The fog-alarm has been painted. A new boiler made by Carrier, Lainé & Co. of Quebec, has been placed in this station. 20 new tubes have been placed in the old boiler.

The floor of the landing of the derrick has been relaid with new material, the deals and one of the davits being replaced. A new pair of ladders was placed from lower to upper landing.

A new coal shed was built at a cost of \$65.

South-west Head Light.

The sum of \$25 was paid for the repairing of the road leading to the station from Seal Cove.

A new top or inside covering of iron was placed on inside of the top of lantern by Mr. Gideon Hevenor. The flag pole was destroyed during a storm and \$10 was allowed for repairing it.

Five new lantern glasses were placed in lantern. A new platform was laid in front of premises and new steps leading to dwelling; also a new floor in the barn.

Spruce Point Light.

This station has been painted and new canvas placed on roof of tower. The bridge leading to the light has been put in good repair.

Swallow Tail Light.

A new pump was supplied and placed in kitchen of the dwelling house. New planking has been placed around the premises, also new water spouts made, and new sills on southern and western sides of building.

The trainway has been repaired, new sills 8 by 6 inches, and new deals laid to the derrick platform for a distance of about 100 feet.

New sills and posts have been placed under the boathouse. The cost of the above repairs was \$88.50 on labour and \$51.54 for lumber.

In addition to these repairs, ordinary repairs and replacing of supplies were made and painting done wherever required.

BUOY SERVICE.

The buoys in the several ports under the control of the New Brunswick agency have been very satisfactorily maintained, the work in most all the ports being done by contract, under the supervision of the harbour masters.

The coast buoys of both the Nova Scotia and New Brunswick districts were attended to by the steamer "Lansdowne".

List of Coast Buoys.

Blond Rock.....	Automatic.....	Nova Scotia.....	Black.
John's Ledge.....	Bell.....	do	Red.
Old Woman.....	Can.....	do	Red.
Old Man.....	Can.....	do	Black.
Pease's Ledge.....	Can.....	do	Red.
Yarmouth Fairway, S. W.	Automatic	do	Black and White.
Yarmouth Fairway, N. W.	Automatic	do	Red.
Yarmouth Fairway	Bell	do	Red.
Roaring Bull.....	Can.....	do	Red.
Trinity Rock.....	Bell.....	do	Red.
North-west Ledge.....	Bell.....	do	Red and Black.
Chebogue	Can.....	do	Black.
South Wolf.....	Automatic.....	New Brunswick.....	Black.
Point Lepreaux	Automatic	do	Black and White.
Split Rock.....	Automatic.....	do	Black.
Black Point....	Automatic.....	do	Black.
Partridge Island.....	Bell Boat.....	do	Black.
Quaco Reef	Bell.....	do	Black.
Quaco Ledge.....	Bell	do	Red.
Quaco Shoal... ..	Can.....	do	Red.

Bell Buoy Boat off Partridge Island.

The bell buoy boat was brought up to St. John, in November last for repairs, and a bell buoy of the Trinity pattern anchored off Partridge Island in its place.

The buoy was found to be in a very bad state, and only such repairs were made on it to make it last another six months, when it will be given a good overhauling.

Black Point Automatic Buoy.

This buoy was removed and replaced by the steamer "Lansdowne" in the fall of 1895, and on the 3rd June, 1896, the buoy was scraped and painted and the moorings overhauled.

Belle Isle Buoys.

Two spar buoys and two barrel buoys are maintained in the Belle Isle Bay by Mr. G. W. Palmer, under contract. The amount of the contract is \$45 per annum, and expires 1st May next.

One cask buoy and fourteen bush buoys are also maintained by Mr. Israel Nobles, at this place, at a cost of \$20 per annum.

Buctouche Buoys.

Mr. Jacob Babineau who had the contract for placing fifteen buoys left the country last fall. The buoys were placed this spring under the supervision of Mr. John Smith, Mr. Babineau's sureties having authorized him to have the work performed. The amount of contract is \$42.

Mr. Frank LeBlanc's contract, amounting to \$18 per annum, for placing and maintaining about 200 bushes from the bridge at St. Mary's expires on the 28th of June, 1898.

Bathurst Buoys.

Mr. E. D. Chase is the contractor for maintaining twenty-five buoys at this place for the sum of \$150 per annum.

The work has been satisfactorily performed. The contract expires on the 1st of May, 1897.

Beaver and Black's Harbour Buoys.

Nine buoys are maintained at these places by Mr. Philip Hutten at a cost of \$120 per annum. The contract expires on the 1st May, 1898.

Bay du Vin Buoys.

Mr. F. B. Williston maintains four spar buoys at this place, at a cost of \$15 per annum, his contract expires on the 13th of April, 1897.

Bay Verte Buoys.

Mr. Jared S. Silliker is the contractor for maintaining five cask buoys and twenty-five small spar buoys. The amount paid the contractor is \$19 per annum.

The contract expires on the 13th May, 1898.

Chebogue Ledge Can Buoy.

The buoy and moorings were overhauled by the steamer "Lansdowne" on the 30th of November, 1895, and on the 20th May, 1896.

Jemseg Buoys.

Mr. Joshua Colwell who had the contract for this district having left the country, his contract was cancelled on the 22nd of April last and the work of staking the dredge track this season was done under the supervision of the inspector of lights.

Careful attention to replacing the bushes from time to time is required as the track is quite narrow, and bushes and stakes are taken out daily by the rafts, making it necessary to replace them immediately.

Lepreaux Automatic Buoy.

This buoy is removed twice a year by the steamer "Lansdowne." It was removed on the 23rd of May last and another buoy with new moorings anchored in its place.

Old Proprietor Spindle.

An iron spindle marks this dangerous place in the Bay of Fundy.

The American (four-masted) schooner "Gypsum Prince" became a total wreck by striking this ledge.

Quaco Buoys.

Three buoys are maintained at this place, two bell and one can buoy. They are lifted every fall, about the 1st December and replaced in the spring about the 1st April.

The work is done by the steamer "Lansdowne."

Richibucto Buoys.

A contract was entered into on the 24th April, 1896, for three years with James L. Legoo for maintaining 28 buoys at this place for the sum of \$200 per annum.

Mr. James Lawson is the contractor for maintaining 30 buoys from Brown's Yard to Kingston Bridge. The amount of the contract is \$90 per annum, and expires 28th April, 1899.

Shediac Buoys.

The work of maintaining the buoys at this place is done under the direction of the harbour master, Mr. D. P. White's contract expiring in May, 1894.

Split Rock Automatic Buoys.

This buoy is removed every fall and spring by the steamer "Lansdowne," and another buoy moored in its place.

Southern Wolf Automatic Buoy.

This buoy was removed last fall and this spring by the "Lansdowne," and another buoy anchored in its place.

The work in connection with the buoys at Caraquette, Cocagne, Head Harbour, Dalhousie, Grand Manan, Grande Anse, Grindstone Island, Kouchibouguac, Letête, Musquash River, Miramichi River, Magaguadavic, Neguac, Napan, Oromocto, Petit Rocher, Pisarinco, Pokemouche, St. John River, Shippegan, St. Andrews, Ste. Croix River, Big Shemogue, Little Shemogue, North and South Tracadie, Washademoak Lake, West Isles and Tynemouth, was all done under contract.

PRINCE EDWARD ISLAND LIGHTHOUSE DIVISION.

This division is under the charge of Mr. Artemus Lord, who is agent of the department at Charlottetown, assisted by Mr. Milton Walsh as foreman of works and warehouseman.

There are in this division 56 lights and 35 stations and 1 steam fog-horn under the charge of 41 keepers. There are 3 automatic whistling buoys and 1 bell buoy. The majority of the lights are situated on headlands and serve the general purposes of navigation, the remainder being harbour lights intended particularly for the benefit of fishermen, 35 harbours in this province are buoyed by the department under contract; the buoys being under the general supervision of the agent.

The work of special inspection and supply of the several lighthouses was done by the agent by the aid of the government schooner "Prince Edward" who on one of his trips was accompanied by Mr. W. P. Anderson, chief engineer of the department.

All the minor repairs and renewing of supplies were done as required at the several stations and the usual painting of the buildings was carried out.

Souris East Breakwater Light,

During a heavy south-west gale in the autumn of 1895, the mast light on the end of the breakwater was carried away, the mast broken, shed demolished and lantern destroyed. On the 4th May last a small light on a low mast was put in operation, but as soon as the new block now being built at the outer end of the breakwater is finished, a more permanent and satisfactory light will be established.

St. Peter's Harbour Lights.

During the past summer the front range light on the government wharf or breakwater was moved from the outer end 18 feet south-westwardly, or shoreward. The outer end of the sloping nose projects into the harbour 40 feet beyond the middle of the tower.

The back range tower was moved north-westwardly along the flat sand beach, and now stands 1,458 feet S. by W. from the front light. In other respects, the two lights have not been changed.

The work of removal was done by Mr. Sennott at a cost of \$70.

Savage Harbour.

The inner range was renewed, the cost for repairs amounting to \$44.45

Summerside Harbour.

The range light in Summerside Harbour put in operation on the 5th September, 1895, was erected, under the personal supervision of Mr. M. Walsh, by day's work, at a total cost of \$225, and considering the height, character of the work and material, it has cost less than others which have been erected by contract. This light, which is fixed red forms a back range for the Summerside wharf light and was erected principally for the use of the mail and passenger steamer "Northumberland," whose captain states the light is all that could be desired, and that the ship is brought in at full speed, irrespective of the condition of the night. The site of this light was purchased from Messrs. John & George Stavart for \$35.

Upon the opening of the back range light, the Summerside wharf light was changed from fixed white to fixed red, and forms with the back range light a direct course from inside Indian Point light, to anchorage off Holman's wharf.

Wright's Range, Crapaud Harbour.

This station is reported to suit admirably for the purpose for which it was erected, that is leading vessels from the eastern end of the basin (inside Tryon Shoal), to anchorage off end of dredged cut to wharf, where a small red light on Palmer's wharf takes up the continuation of the course by being brought in one with the main tower, leading direct up the cut to wharf.

Cascumpec Harbour.

The range lights at Cascumpec Harbour, on the Gulf of St. Lawrence coast of Prince Edward Island, were, on the 11th November, 1896, discontinued, and will not be re-lit until further notice, as they no longer mark the channel through the bar at the mouth of the harbour.

The channel has shifted about $\frac{1}{4}$ mile northwardly from its previous position, and a black spar buoy has been moored on the outer bar in 10 feet water at the new crossing. From this buoy to a red cask buoy off Malones Point the course is about south-west; from Malones Point buoy the course is west, in the alignment of the range light buildings.

Strangers should not attempt to enter Cascumpec Harbour without a pilot, as the depth over the bar in the range of the extinguished lights is only six feet.

Removal of Whistling Buoy from North Point to West Point.

The whistling buoy formerly maintained off North Point was, on the 13th May last, removed to West Point.

The buoy is painted red, with "West Point Buoy, Canada," in white, and is located $\frac{3}{4}$ mile west of the middle of the outer shoal, in 13 fathoms of water.

From the buoy, West Point light bears S. E. by S. $\frac{3}{4}$ mile, and Wolfe Point, E. by S. 5 miles.

The automatic whistling buoy moored off Indian Rocks, in the Straits of Northumberland, which was moved in 1893 to about a mile and a half south-westwardly from its original position, is found to give a better berth to vessels making it from Prim reef buoy or Cape Bear.

BRITISH COLUMBIA LIGHTHOUSE DIVISION.

This division comprises all Canadian waters on the Pacific coast, and is under the charge of Captain James Gaudin, agent of the department at Victoria, who also acts as inspector of lights.

There are in this province 14 light stations, 6 of which are steam fog-alarms, and at 4 others, bells rung by machinery. There are also two beacon lights in Victoria Harbour, and two similar lights in Nanaimo Harbour, which as aids to navigation are highly appreciated.

The lights are in charge of sixteen lightkeepers, some of whom supply assistance out of the salaries allowed.

The lights were supplied by the Dominion steamer "Quadra," Captain J. T. Walbran, master—and the fog-alarm machinery at the several stations receive the annual inspection of the chief of the "Quadra."

NEW AIDS TO NAVIGATION AND IMPROVEMENTS IN EXISTING AIDS.

Carmanah Light, Fog-alarm, Telegraph and Signal Station.

In order to increase the efficiency of the station, a steam whistle was on the 1st July last attached to the fog-alarm boiler at Carmanah Station, to be used in addition to the horn, which will be operated as before, for communicating, in foggy weather, with passing steamers. A private code has been arranged with several steamers. Strangers may communicate with the station by whistle sounds, using the "Morse" or "Continental" telegraphic codes.

Lightkeeper Daykin and his assistants were instrumental in rescuing thirteen men from the wreck of the British SS. "Janet Cowan" last winter and cared for them at the light-house until opportunity offered to take them to Victoria. They also buried the bodies of the master and three seamen, who had been left where they fell by their shipmates.

Race Rocks.

From the 1st July, 1896, in addition to the regular fog-signal, which consists of single blasts of a whistle of five seconds' duration, with intervals of seventy-two seconds between them, a signal of four short blasts in answer to the fog-signal of any steamer enveloped in fog in Juan de Fuca Strait, denotes that the northern portion of the strait is free from fog, it often happening that when there is thick fog in the southern part of the strait, the northern portion is perfectly clear, and in such circumstances, the special signal now arranged enables steamers to clear the fog readily.

Active Pass.

From the 1st June, 1896, the fog-horn was arranged to give blasts of eight seconds' duration, with intervals of 52 seconds between them, that is, one blast per minute.

Portlock Point.

The fog-bell used at Active Pass previously to the establishment of the storm fog-alarm, has been removed to Portlock Point Light Station, where it has been in operation since the 1st September, 1896.

The bell is suspended in a small wooden tower, painted white, located on a low point, 900 feet S. E. from the lighthouse.

The bell is struck by a hammer operated by machinery, and regulated to give one stroke every 15 seconds.

Sand Heads.

Two clumps of piles placed to protect the iron pile foundation from driftwood, and to replace others which disappeared last winter, were driven by the crew of the Dominion steamer "Quadra."

The Sturgeon Bank beacons, off the mouth of the Fraser River, were kept in position by the "Quadra," and replaced, when necessary, the piles for this purpose being supplied by Mr. George Georgeon, of Mayne Island, at five cents per foot, this being the lowest tender.

North Arm and Canoe Pass channels, leading to the Fraser river, have been marked with piles, and these beacons are a distinct benefit to small local craft.

Mud Bay.

The channels leading from Boundary or Mud Bay to the Serpentine and Nicomekl Rivers, and to Big Slough, have been marked with 39 piles by the crew of the government steamer. This work has given great satisfaction to the farmers of the delta of the Fraser, who, in previous years, had suffered many losses through the unsafe navigation of the channels.

A wooden pile beacon, surmounted by a red ball made of lattice work, and showing 12 feet above high water, has been established at the extreme northern edge of Spanish Bank, at the entrance to Burrard Inlet, replacing the wooden buoy previously moored off the edge of Spanish Bank, which has been withdrawn.

Four beacons, composed of three piles each, braced together at the head, showing 7 to 9 feet above high water, have been erected in Sooke Harbour, on the south coast of Vancouver Island to mark the fairway.

Three pile beacons have been erected at the entrance to Somass River, Alberni Canal, west coast of Vancouver Island, to replace a corresponding number of spar buoys heretofore marking this channel.

Two wooden platform buoys have been placed in Colburne Passage, off the south-east coast of Vancouver Island, one on either side of the fairway between Piers Island and Saanich Peninsula on the route to Cowitchan Harbour.

An iron platform buoy, surmounted by a framework of wood in the shape of a cone has been moored on the east side of Governor Rock, Trincomalee Channel.

The No. 1 red buoy marking the western extremity of Robert's Bank, entrance to Fraser River, Strait of Georgia, has been replaced by a wooden beacon composed of three stout piles braced together at the head, painted black and surmounted by a lattice work ball.

The following changes and improvements were made in the buoyage at Baynes Sound :—

The red spar buoy moored off Reef Bluff was replaced by an iron nun buoy.

An additional new iron nun buoy was placed off the West Spit of Reef Bluff.

The west beacon marking the crossing over Kelp Bar, at the north entrance to Baynes Sound was replaced and the two beacons were changed in colour from black to red to conform with the rules governing buoys and beacons.

Notice boards have been established at intervals along the south coast of Vancouver Island between Cape Beale Lighthouse and San Juan Harbour. These boards contain information for the use of shipwrecked mariners on the Pacific coast of Canada, respecting the direction and distance of the nearest lighthouse and also of the nearest Indian village where assistance can be obtained.

The following is a synopsis of the principal repairs and improvements effected at the lighthouse stations in this division during the past season :—

Cape Beale.

Some trees were cleared away at the station for the preservation of the tramway, at a cost of \$40.

Carmanah.

A new set of tubes was put in the boiler of the fog-alarm, and a few minor repairs effected.

Two men were employed for ten days removing large boulders deposited during the winter's gales in the landing, as also some trees, which menaced the safety of some out-buildings, at a cost of \$50.

Race Rocks.

The boat landing which had become blocked up last winter was cleared away at a cost of \$20, one labourer being supplied to the keeper for a period of ten days.

East Point.

Owing to the difficulty in obtaining water for domestic purposes, and to the slight rainfall at this point, it was found necessary to build a tank shed for storing a supply. The necessary material was furnished the keeper, who put up the shed. New boats' ways have been laid to replace the old ones eaten away by teredo.

Point Atkinson Light and Fog-Alarm.

The foundations of the cylinders of the fog-alarm which were completely rotted away, were replaced last spring by the engineer of the "Quadra."

BUOYS AND BEACONS.

There are about 300 harbours, bays and sections of rivers buoyed in the Dominion of Canada. In most cases contracts for a period of three years are entered into to maintain the buoy service. In some instances the buoys are placed by the harbour masters, who furnish accounts to the department for the work done and material supplied.

The large whistling and bell buoys maintained off the coast of Nova Scotia, New Brunswick, British Columbia and Prince Edward Island are attended to by Dominion steamers. The gas and other buoys above and below Quebec in the Quebec agency are also maintained by government steamers, but occasionally tugs are employed when the steamers are not available. The large coast buoys maintained by the government steamers are specially referred to under the heading of each lighthouse division.

The expenditure in connection with the buoy service for the year ended 30th June, 1896, was as follows:—

For the province of Quebec, including port of Montreal....	\$18,431 41
Above Montreal, including Ontario.....	7,200 82
New Brunswick.....	7,996 64
Nova Scotia.....	8,204 87
British Columbia.....	4,774 22
Prince Edward Island.....	2,684 84
Total	<u>\$49,295 80</u>

This includes the expenditure incurred in the construction of new automatic buoys.

OIL FOR THE USE OF LIGHTHOUSES.

The oil for lighthouse purposes has been purchased from the Imperial Oil Company of Petrolia, by contract, which was entered into on the 23rd March, 1896, for a period of one year.

The quantity of oil supplied to the lights above Montreal by the Imperial Oil Company during the year 1896 was 24,897 gallons, imperial measure, which cost \$4,444.46; to the lights in the Quebec district 26,019 gallons, which cost \$4,711.98; to the Nova Scotia district 31,050 gallons, costing \$6,986.25; to the New Brunswick district 5,400 gallons, costing \$1,201.50; to the Prince Edward Island district 6,300 gallons, which cost \$1,464.75, making the total quantity purchased from the Imperial Oil Company 93,966 gallons, and the total cost \$18,808.94. In addition to this the department purchased from the Standard Oil Company of New York 1,600 gallons of American oil for the New Brunswick district at a cost of 18½ cents per gallon; in New York, for the Nova Scotia district 5,000 gallons, at a cost of 18½ cents per gallon; for the district above Montreal 1,300 gallons, at the same price, in New York. The freight was paid by the department.

The total quantity of American oil purchased was 7,900 gallons, wine measure. The quantity purchased for British Columbia to date is 4,500 gallons of American oil at 22 cents per gallon.

The list of prices according to contract with the Imperial Oil Company is as follows:—

Delivered at	Per gallon in barrels.	Per gallon in cases.
	Cents.	Cents.
Sarnia.....	15½	20
Hamilton.....	16½	21½
Kingston.....	16½	21½
Montreal.....	17	21½
Quebec.....	17½	22½
St. John, N.B.....	17½	22½
Pictou, N.S.....	18½	23½
Halifax.....	17½	22½
Charlottetown.....	18½	23½

COST OF MAINTAINING LIGHTHOUSES AND DOMINION STEAMERS.

The following comparative statement shows the expenditure on account of maintenance of lighthouses and steam fog-whistles from the years 1883-84 to 1895-96, both inclusive. The method of auditing all accounts in the department before payment has been followed of late years:—

Year.	Number of Lights.	Number of Fog- whistles.	Number of Fog-horns, Bells and Bombs.	Cost of Maintenance.
				\$ cts.
1883-84.....	579	23	10	456,868 33
1884-85.....	617	23	12	478,064 04
1885-86.....	625	23	16	505,929 27
1886-87.....	658	23	24	476,514 44
1887-88.....	664	23	27	464,471 76
1888-89.....	675	24	29	459,423 80
1889-90.....	705	23	32	434,802 10
1890-91.....	710	23	31	455,254 42
1891-92.....	741	22	56	445,140 16
1892-93.....	747	22	56	480,553 52
1893-94.....	755	22	58	470,549 27
1894-95.....	769	22	59	467,547 81
1895-96.....	766	22	60	442,701 96

DOMINION STEAMERS.

"NEWFIELD."

The "Newfield" was employed from the 1st of July to the 2nd of September, 1895, in lighthouse and buoy work. On the 2nd September, a load of ponies was taken on board at Sable Island and landed at Halifax on the 4th of the same month. It is usual for this steamer to be employed in laying cable for the Public Works Department, and on the 6th of September, the steamer took on board cable and gear and proceeded to lay the cable, and was engaged in this work until the 25th of November. Stores were placed on board and the vessel proceeded to Sable Island. The "Newfield" remained in commission during the winter and was engaged in overhauling and repairing coast buoys and delivering coal to fog-alarms. In April the steamer was laid up at the wharf at Halifax for general repairs, which were made by the crew assisted by mechanics. On the 6th May, the "Newfield" again took on board supplies for Sable Island and was afterward engaged in lighthouse and buoy-work, while at intervals, painting and other work was done at Halifax and the usual work resumed until the end of the fiscal year.

"ABERDEEN."

This steamer from the 1st of July, 1895, was engaged in the Quebec agency for two months in supplying light and fog-alarm stations in the River and Gulf of St. Lawrence, including the Straits of Belle Isle. After her return to Halifax, lighthouse supply work was performed and a trip made to Sable Island. The steamer proceeded on the 25th of September to Quebec for the purpose of delivering supplies to various lighthouses in the Quebec agency, calling on her way at Miscou, on the north

shore of New Brunswick, to land materials. The "Aberdeen" returned to Halifax in November, and was employed in lighthouse inspection service till put out of commission in the latter part of December. Repairs were made to the machinery during the winter months under the inspection of Mr. Douglas Stevens. The vessel was again put into commission and entered the fishery protection service about the 18th May. Several weeks protection work was done by this steamer of a valuable nature, and she again was employed in lighthouse and buoy service until late in June, when she proceeded to Quebec for the St. Lawrence River and Gulf work.

"STANLEY."

This steamer was engaged in fishery protection service during the summer of 1895, and was relieved from that work in November in order to make repairs as usual, before entering upon the winter service. In November the large buoys near Cape Tormentine and on the coast of Prince Edward Island were lifted and conveyed to Charlottetown, to be stored for winter. The "Stanley" entered upon the winter mail service as usual on the 1st of December, 1895, between Charlottetown and Pictou, and remained on that route until the 6th of January, 1896. The vessel entered upon the Georgetown-Pictou route on the 6th of January, 1896, and continued up to the 25th of February, when she was laid up to clean her boilers, having made from date of starting 47 round trips.

On the 9th March the "Stanley" resumed her trips between Georgetown and Pictou, and continued until the 11th April when she returned to Charlottetown and remained on the route between that port and Pictou until the 30th of April, having made during the winter 81 round trips. Her earnings for the season were \$11,039.94.

"LANSDOWNE."

The "Lansdowne" for a length of time was engaged in lighthouse and coast buoy service, then she entered upon tidal survey service which was ended in October, 1895. The steamer was then engaged in lighthouse inspection and buoy service, and went into winter quarters on the 7th December, 1895. During the winter the "Lansdowne" was extensively repaired. The vessel was thoroughly caulked and her bottom received two coats of copper paint. The cabin, state-rooms, mess-room, square and dardanelles were all painted and also the hull of the ship inside and outside. Repairs were also made to the machinery under the superintendence of the chief engineer.

On the 13th May the steamer took on board supplies for Machias Seal Island, and was engaged in lighthouse inspection and delivery of supplies until the 22nd of June, 1896, when supplies were placed on board for the tidal survey. This service was entered upon on the 24th June, 1896.

"QUADRA."

This vessel was continuously employed in lighthouse and buoy work until the 25th of October when an accident occurred. When coming down Haro channel in foggy weather she ran on Fulford Reef for upwards of half her length. The vessel was pulled off the reef by tugs employed by the department with considerable difficulty. Fortunately the vessel did not sustain injury of a nature to prevent her from

continuing the work of placing buoys. The "Quadra" was docked on the 12th of December, and tenders were invited for repairs. These repairs were effected for the sum of \$5,000, the cost of taking the steamer off of the reef formed a separate charge. On the 9th February the "Quadra" was sent in search of two missing vessels reported wrecked, but the search was not successful. The "Quadra," from the beginning of March, was employed in attending to aids to navigation in Colborne passage, the channels leading to the Serpentine and Nicomekl Rivers from Boundary Bay, Canoe Pass and North Arm channels to the Fraser River. The vessel made a cruise lasting eleven days in connection with protection of Canadian sealing vessels. The "Quadra" was despatched to Queen Charlotte Sound, to inquire into alleged infraction of fishery and revenue regulations, and on return was placed in the fishery service for the purpose of planting eastern oysters.

" DRUID."

On the 1st July, 1895, the steamer was engaged in attending to gas buoys which need replenishing occasionally with gas. The "Druid" was employed in various kinds of work, consisting of towing lightships to their positions and in delivering supplies to lighthouses in the River St. Lawrence until the 9th of November, 1895, when the vessel was despatched to raise the gas and other buoys. On the 23rd of November the crew was paid off. The crew was again shipped in April, 1896, and were set at work to make repairs and paint the ship. The vessel entered upon her work on the 29th April, and was engaged in placing lightships and delivering supplies until the 10th June. His Excellency the Governor General and Lady Aberdeen were taken on board and the vessel proceeded around the harbour of Quebec. The vessel was next sent to St. Anne, having on board His Excellency's family. On the 17th the "Druid" resumed her regular work until the 29th June, 1896.

STATEMENT showing cost of maintaining Dominion Steamers from 1884 to 1896.

Year.	Cost of Maintenance.
	<div style="text-align: right;">\$ cts.</div>
1883-84.....	122,816 25
1884-85.....	148,864 26
1885-86.....	130,759 83
1886-87.....	141,424 42
1887-88.....	150,659 19
1888-89.....	126,629 33
1889-90.....	114,959 20
1890-91.....	111,437 03
1891-92.....	127,406 28
1892-93.....	146,521 77
1893-94.....	142,487 42
1894-95.....	129,899 20
1895-96.....	150,519 41

The following statement shows the expenditure for maintenance and repairs and the receipts for the fiscal year ended 30th June, 1896 :—

Name.	Repairs.	Maintenance.	Total.	Receipts.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
General account.....			810 76	
"Alert".....			4 25	
"Druid".....	5,903 90	9,899 41	15,803 31	
"Newfield".....	4,187 97	21,852 73	26,040 70	5,000 00
"Lansdowne".....	1,910 08	24,636 86	26,546 94	
"Stanley".....	1,883 60	27,537 88	29,421 48	11,039 94
"Quadra".....	5,760 52	23,605 06	29,365 58	
"Aberdeen".....	932 31	21,226 37	22,158 68	
"La Canadienne".....			251 78	
"Sir James Douglas".....			115 93	
			150,519 41	

The expenditure for maintenance of the "La Canadienne" is paid out of the Fishery Protection Service.

Receipts are already deducted from expenditure in connection with "Newfield."

ICE BOAT MAIL SERVICE.

This service began on the 24th January, 1896, when the "Stanley" ceased to make daily trips, and was continued up to the 5th April, 1896, resumed on the 11th April and ended on the 18th of the same month, during which time the following work was performed :—

Number of mail bags carried	4,316	as against	3,497	in 1895.
Excise baggage carried.	1,019	do	458	do
Express goods carried.....	12	do	67	do
Number of passengers hauled in the boats.	12	do	9	do
Number of strap passengers carried	145	do	77	do

The expenditure for this service was \$7,779.69, and the total earnings amounted to \$357.08.

CERTIFICATES TO MASTERS AND MATES FOREIGN SEA-GOING.

The report of the Chairman of the Board of Examiners of Masters and Mates of sea-going ships for the twelve months ending the 30th June, 1896, will appear as an appendix to this report.

During the fiscal year, it will be seen by reference to the report in the appendix, the Board of Examiners have held meetings for the examination of candidates at the ports of Halifax, N.S., St. John, N.B., Quebec, and Yarmouth, N.S. Seventy-nine candidates presented themselves for examination at the ports named; 71 succeeded in passing, while 8 failed. Of the 71 that passed, 35 received certificates as master and 36 as mate.

The number of candidates who have passed and obtained certificates of competency as master or mate since the Act went into operation, viz.: 16th September, 1871, to the 30th of June, 1896, is 3,213, and the fees paid for these certificates amounted to \$64,432.71.

The amount received for the renewal of certificates during the twelve months ended 30th June, 1896, was \$108.50, and the number renewed 30.

In an appendix to this report will be found a list of all who have obtained certificates of competency and service either as master or mate, during the year ended 30th June, 1896.

INLAND AND COASTING CERTIFICATES.

During the twelve months ended 30th June, 1896, the number of candidates in the Dominion who have passed and obtained masters' certificates of service is 24, and 4 certificates of service have been issued to mates; the amount paid for these certificates was \$102.

The number of certificates of competency as master was 137, as mate 77, and the amount paid for these certificates was \$1,404. The amount received for renewed certificates of competency and service was \$78.50, making a total of \$1,482.50 received from masters' and mates' inland and coasting certificates.

A list of certificates issued during the twelve months ended 30th June, 1896, will be found in the supplement to this report.

The total amount of fees received on account of certificates of competency and service, sea-going and inland and coasting, during the fiscal year ended 30th June, 1896, amounted to \$2,307.50, and the amount in detail expended on account of the service will be seen by reference to Appendix No. 1 to this report was \$4,062.82. The vote for this service was \$5,000, and the sum expended to the 30th June, 1896, \$4,062.82, leaving an unexpended balance of \$937.18.

The following statement shows the total receipts and expenditure on account of masters and mates since 1871:—

		Expenditure.	Receipts.
		\$ cts.	\$ cts.
For the fiscal year ended 30th June, 1871		1,410 45	
do do 1872		4,312 07	1,344 00
do do 1873		6,466 18	4,963 00
do do 1874		4,520 19	2,995 00
do do 1875		5,696 62	2,715 00
do do 1876		4,672 08	2,021 87
do do 1877		4,050 00	1,740 50
do do 1878		4,249 76	1,296 50
do do 1879		4,250 12	1,334 50
do do 1880		4,253 43	1,547 00
do do 1881		3,888 41	1,333 50
do do 1882		3,965 19	1,152 50
do do 1883		4,021 20	1,314 00
do do 1884		3,909 59	9,437 50
do do 1885		4,324 15	2,897 00
do do 1886		5,245 28	2,152 00
do do 1887		4,855 93	2,172 00
do do 1888		5,060 96	3,220 80
do do 1889		4,381 04	2,202 00
do do 1890		4,117 83	2,186 00
do do 1891		4,255 24	2,586 00
do do 1892		4,363 88	2,194 00
do do 1893		4,116 99	2,484 00
do do 1894		3,721 33	2,907 04
do do 1895		3,758 29	3,974 50
do do 1896		4,062 82	2,307 50
Expenditure.....		111,929 08	64,432 71
Receipts.....		64,432 71	
Excess of expenditure over receipts		47,496 37	

WRECKS AND CASUALTIES.

The total number of casualties to British and Canadian sea-going vessels reported to the department, as having occurred in Canadian waters and to Canadian sea-going vessels in waters other than those of Canada, during the twelve months ended 30th June, 1896, was 273, representing a tonnage of 98,424 tons register, and the amount of loss both partial and total, to vessel and cargoes as far as ascertained, was \$1,236,761. The number of casualties to inland vessels was 21, tonnage 5,408, loss \$105,320.

The number of lives reported lost in connection with these casualties was 43. A statement of the wrecks and casualties forms an appendix to this report.

SICK AND DISTRESSED MARINERS.

Under the provisions of chapter 76, Revised Statutes, a duty of two cents per ton register is levied on every vessel arriving in any port in the province of Quebec, Nova Scotia, New Brunswick, Prince Edward Island and British Columbia, the money thus collected forming the Sick Mariners' Fund. Vessels of the burden of 100 tons and less pay the duty once in each calendar year, and vessels of more than 100 tons, three times in each year.

By an amendment of this Act passed at the session of Parliament in 1886, 50-51 Victoria, chapter 40, it is provided that no vessel which is not registered in Canada and which is employed exclusively in fishing or on a fishing voyage, shall be subject to the payment of this duty.

The receipts for the fiscal year ended 30th June last amounted to \$45,751.61, being an increase of \$2,935.87 as compared with the preceding year. The increase or decrease in receipts for sick mariners' dues in the various provinces were as follows:—Nova Scotia, increase, \$97.76; Quebec, increase \$2,202.33; New Brunswick, increase \$854.58; Prince Edward Island, decrease \$170.92; British Columbia, decrease \$65.88.

The Sick Mariners' Act does not apply to the province of Ontario, and consequently no dues are collected from vessels in that province, although a small expenditure is incurred on account of sick seamen. An appropriation is made by Parliament to cover the expenditure at Kingston and St. Catharines, where general hospitals have been established and sick seamen are attended. During the fiscal year ended 30th June sick seamen were paid for at a per diem rate of 90 cents. The amount paid to St. Catharines Hospital was \$320.40 for attendance on 8 sick seamen for 356 days.

In the province of Quebec the expenditure on account of sick seamen amounted to \$6,797.92, being \$738.26 more than the previous year. The total collections for the entire province amounted to \$13,489.66, being \$2,202.33 more than the previous year.

At the port of Montreal sick seamen are cared for at the general hospital and at Notre Dame hospital, under an arrangement made by the department, by which 90 cents per diem is paid for board and medical attendance of each seaman. The number of seamen admitted to the Montreal general hospital was 122, and the number of days during which they received treatment and board was 560. The

total cost, including ambulance hire, being \$504. The amount paid the Notre Dame Hospital was \$853.20, for the treatment of 136 sick seamen, for a total number of 948 days.

Chicoutimi hospital received 14 seamen to whom medical treatment and board were given at a cost of \$561.60. The sick mariners' dues collected at the port of Montreal during the fiscal year ended 30th June amounted to \$3,370.60.

At the port of Quebec sick seamen were cared for at the Jeffery Hale and the Hotel Dieu hospitals, the sum of 90 cents per diem for each seaman is allowed in return for medical attendance and board. The sum paid the Jeffery Hale hospital was \$1,851.30, where 116 men received treatment for a total number of 2,057 days. The sum of \$363.60 was paid the Hotel Dieu hospital for attendance of 16 seamen 404 days. At the Hotel Dieu de Lévis 6 seamen were treated 366 days at a cost of \$329.40. The sick mariners' dues collected at Quebec amounted to \$7,277.38.

The expenditure on account of sick seamen in the province of New Brunswick for the fiscal year amounted to \$4,961.92, being \$2,017.50 less than the preceeding year, and the collection of dues to \$10,027.30, or \$854.58 more than the previous year. Marine hospitals have been maintained at Miramichi, Richibucto and Bathurst.

At the general public hospital at St. John, 109 seamen were treated 1,556 days at a cost of \$1,400.40.

At Miramichi 46 seamen were admitted and received treatment 990 days at a cost of \$424.72.

At Richibucto, 2 seamen were admitted and received treatment for 26 days. The cost of maintaining the hospital was \$11.14.

At Bathurst 9 seamen were in hospital 391 days. The cost of maintaining the hospital during the year was \$198.50.

The St. Andrew's hospital is in charge of a matron, who is allowed to charge \$3 per week for boarding sick seamen. No salaries are paid in connection with the maintenance of hospital. At the port of St. Andrew's the expenditure was \$100.

The Sackville hospital has been leased to Mr. Bradford Carter for a term of years from 1892, at a nominal rental. The terms of the lease require Mr. Carter to keep the buildings in repair, and if the department should require the hospital at any time, it is to be handed over on notice being given.

In the province of Nova Scotia, marine hospitals are maintained at the ports of Yarmouth, Pictou, Sydney, Lunenburg and Point Tupper. The total expenditure on account of sick seamen in the province of Nova Scotia, for the fiscal year, amounted to \$14,120.96, and the receipts to \$15,129.23.

The marine hospital at Yarmouth is located at Bunker's Island. Thirty-one seamen were admitted during the year ended 30th June, who were treated 677 days, the expenditure for this purpose being \$290.20.

At Halifax provision is made for the care of sick seamen at the Victoria general hospital, under arrangements made with the managers, by which the sum of 90 cents per diem is allowed for board and medical attendance to sick seamen. The sum paid the managers of the hospital for board and medical treatment during

the past fiscal year was \$3,195. The number admitted was 207, and the number of days for which treatment is charged is 3,546.

At Lunenburg, 28 seamen were admitted and received medical treatment 733 days, the cost of maintaining the hospital being \$314.55.

At Pictou 17 seamen were admitted to the hospital, their total treatment being for 319 days. The sum paid in connection with maintaining the hospital was \$136.71.

At Sydney 54 seamen received medical treatment, the total number of days being 621, and the amount expended in maintaining the hospital was \$266.18.

At Point Tupper 15 seamen were admitted to the hospital, the total number of days for which they received treatment being 201, and the amount expended in connection with keeping the hospital was \$86.15.

In the province of Prince Edward Island the amount expended on account of sick and disabled seamen during the fiscal year was \$1,705.88, and the receipts from sick mariners' dues were \$271.32.

Sick seamen are cared for at the Charlottetown and Prince Edward Island hospitals, under arrangements made with the managers of these institutions, at the same rate that is paid to the public hospitals in other parts of the Dominion.

The Charlottetown hospital admitted 22 sick seamen, giving them treatment for 1,106 days; the amount paid was \$995.40.

At Prince Edward Island hospital 7 men received medical treatment for a total number of 111 days. The sum of \$99.90 was paid to the managers for the fiscal year ended 30th June.

In the province of British Columbia the sum of \$5,803.49 was expended for sick and disabled seamen, while the receipts from the collection of sick mariners' dues amounted to \$2,429.90.

The marine hospital at Victoria has in attendance a medical superintendent with a salary of \$300 per annum, a keeper whose salary is \$500 per annum. He is also allowed a rate of \$5 per week for board and attendance of each seaman. The keeper procures fuel, light, bedding, etc., at his own expense. The number of seamen admitted to the hospital for the past year was 112, and the total number of days during which they received treatment was 1,608, and the sum expended was \$1,643.54.

At ports where no hospitals are established in the provinces of Quebec, Nova Scotia, New Brunswick, British Columbia and Prince Edward Island, sick seamen are cared for under the direction of the chief officer of customs, when the vessels to which the seamen belong have paid dues according to law. A circular to collectors of customs was issued 7th February, 1891, permitting sick seamen to be attended to at the port of arrival of a vessel, provided that the regular dues were previously paid at some port.

During the fiscal year the sum of \$3,049.79 was expended for shipwrecked and destitute seamen, under the provisions of the Sick and Distressed Mariners' Act. Of this sum \$1,718 was paid to Her Majesty's Imperial Government to reimburse expenses incurred in caring for shipwrecked and distressed Canadian seamen in foreign ports.

The total expenditure by this department on account of sick and disabled seamen amounted to \$36,683.36, and the appropriation by Parliament for this service was \$38,500. The dues collected amounted to \$45,726.11. It will be seen that the receipts exceed the expenditure \$9,068.25.

The receipts and expenditure in connection with this service from the year 1869 were as follows:—

	Receipts.	Expenditure.
	\$ cts.	\$ cts.
For the fiscal year ended 30th June, 1869.....	31,353 78	26,987 64
do do 1870.....	31,410 46	27,029 34
do do 1871.....	29,683 41	28,971 22
do do 1872.....	34,911 64	34,947 60
do do 1873.....	37,136 10	41,016 43
do do 1874.....	41,500 16	59,778 90
do do 1875.....	37,801 46	50,684 76
do do 1876.....	41,287 66	48,828 49
do do 1877.....	43,739 21	51,647 94
do do 1878.....	44,665 07	43,780 90
do do 1879.....	37,779 57	42,729 36
do do 1880.....	42,523 20	42,160 91
do do 1881.....	49,779 72	40,667 52
do do 1882.....	45,951 47	39,359 11
do do 1883.....	45,573 42	36,249 65
do do 1884.....	48,667 07	39,553 56
do do 1885.....	39,068 39	44,501 57
do do 1886.....	40,848 05	50,377 62
do do 1887.....	42,334 92	37,447 35
do do 1888.....	41,669 64	36,447 85
do do 1889.....	39,306 29	41,320 59
do do 1890.....	47,881 75	41,729 11
do do 1891.....	43,829 68	35,156 12
do do 1892.....	45,381 92	33,498 83
do do 1893.....	46,190 69	35,062 37
do do 1894.....	49,105 40	38,403 94
do do 1895.....	42,815 74	38,332 55
do do 1896.....	45,751 61	36,683 36
Total.....	1,167,947 48	1,126,350 31
Deduct expenditure from receipts.....	1,126,350 31	
Excess of expenditure over receipts.....	41,597 17	

MERCHANT SHIPPING.

The total number of vessels remaining on the register books of the Dominion on the 31st December, 1896, including old and new vessels, sailing vessels, steamers and barges, was 7,279, measuring 789,299 tons register tonnage, being an increase of 17 vessels and a decrease of 36,537 tons register, as compared with 1895. The number of steamers on the registry books on the same date was 1,762 with a gross tonnage of 251,176 tons. Assuming the average value to be \$30 per ton, the value of the registered tonnage of Canada, on the 31st December last, would be \$23,678,970.

The number of new vessels built and registered in the Dominion of Canada during the last year was 227, measuring 16,146 tons register tonnage. Estimating the value of the new tonnage at \$45 per ton, it gives a total value of \$726,570 for new vessels.

A statement follows, showing the number of vessels and number of tons on the register books at the different ports of registry in the Dominion, on the 31st Decem-

ber last, along with a comparative statement of the tonnage from 1873 to 1896. A statement is also published of the number of vessels built and registered in the Dominion during the last year, and a comparative statement of the number of new vessels built and registered from 1874 to 1896, both inclusive.

STATEMENT showing the number of Vessels and number of Tons on the Registry Books of the Dominion of Canada, on the 31st December, 1896.

PROVINCE OF NEW BRUNSWICK.

Name of Port.	Total Number of Sailing Ships and Steamers.	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
Chatham	355	36	1,689	9,940
Dorchester.....	6			3,370
Moncton	16	1	20	2,708
Richibucto.....	16	2	79	2,772
Sackville	12	2	41	1,094
St. Andrews	136	6	2,435	4,351
St. John.....	423	64	7,048	91,271
Total.....	964	111	11,312	115,506

NOVA SCOTIA.

Amherst.....	7			384
Annapolis.....	57	3	85	5,800
Arichat.....	124	1	66	5,196
Barrington	54			1,962
Canso.....	2			83
Digby.....	168	5	254	9,100
Guysboro'.....	31			1,381
Halifax.....	803	58	12,267	44,173
Liverpool.....	84	3	178	5,561
Lunenburg	336	7	387	27,157
Maitland.....	22	1	52	20,960
Parrsboro'.....	141	2	201	31,408
Pictou.....	67	19	1,145	13,144
Port Hawkesbury.....	85	3	43	2,915
Port Medway.....	22	1	45	1,849
Pugwash.....	8			634
Shelburne.....	104	2	83	5,835
Sydney.....	106	8	604	5,003
Truro.....	3			860
Weymouth.....	40	2	175	3,347
Windsor.....	143	11	2,388	88,805
Yarmouth.....	262	18	4,107	41,969
Total.....	2,669	144	22,080	317,526

QUEBEC.

Amherst, M. I.	19			675
Gaspé.....	38	1	709	2,189
Montreal.....	525	171	57,117	87,883
New Carlisle.....	12	2	45	242
Percé.....				
Quebec.....	875	130	19,034	67,660
Total.....	1,469	304	76,906	158,649

STATEMENT showing the Number of Vessels and Number of Tons on the Registry Books, &c.—Continued.

ONTARIO.

Name of Port.	Total Number of Sailing Ships and Steamers.	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
Amherstburg.....	2			121
Belleville.....	20	13	556	893
Bowmanville.....	4			752
Brockville.....	29	27	391	432
Chatham.....	28	17	873	1,511
Chippewa.....	3		263	153
Cobourg.....	4	1	15	311
Collingwood.....	66	64	7,188	5,338
Cornwall.....	2	2	172	109
Cramahe.....	2			278
Deseronto.....	18	13	1,383	1,387
Dunnville.....	2	2	204	122
Goderich.....	42	25	689	1,813
Hamilton.....	49	37	4,820	4,741
Kingston.....	197	78	11,606	26,539
Morrisburg.....	3			382
Napanee.....	3			409
Oakville.....	4			295
Ottawa.....	324	179	13,962	25,958
Owen Sound.....	33	31	5,881	4,279
Picton.....	32	11	1,383	3,330
Port Arthur.....	7	7	2,863	1,845
Port Burwell.....	11	4	41	890
Port Colborne.....	6	2	95	681
Port Dover.....	18	6	170	976
Port Hope.....	63	37	3,032	5,992
Port Rowan.....	4	1	168	351
Port Stanley.....	12	10	1,311	1,097
Prescott.....	29	15	1,011	4,078
Sarnia.....	29	21	8,391	7,091
Saugeen.....	9	9	388	266
Sault Ste. Marie.....	15	12	477	851
St. Catharines.....	126	57	8,197	18,509
Toronto.....	242	165	15,869	16,829
Wallaceburg.....	31	17	1,068	2,024
Whitby.....	3			514
Windsor.....	53	27	6,218	5,375
Total.....	1,525	892	98,665	146,522

PRINCE EDWARD ISLAND.

Charlottetown.....	174	21	4,856	16,540
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BRITISH COLUMBIA.

New Westminster.....	90	73	11,100	8,026
Vancouver.....	52	47	3,323	2,566
Victoria.....	221	96	15,711	16,090
Total.....	363	216	30,134	26,622

STATEMENT showing the Number of Vessels and Number of Tons on the Registry Books, &c.—Concluded.

MANITOBA.

Name of Port.	Total Number of Sailing Ships and Steamers	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
Winnipeg.. .. .	115	74	7,224	7,934

SUMMARY.

New Brunswick	964	111	11,312	115,506
Nova Scotia	2,669	144	22,080	317,526
Quebec	1,469	304	76,905	158,649
Ontario	1,525	892	98,665	146,522
Prince Edward Island	174	21	4,856	16,540
British Columbia	363	216	30,134	26,622
Manitoba	115	74	7,224	7,934
Grand total.....	7,279	1,762	251,176	789,299

COMPARATIVE STATEMENT showing the Number of Vessels and Number of Tons on the Registry Books of the Dominion of Canada, on the 31st December, in each Year, from 1873 to 1896, both inclusive.

Provinces.	1873.		1874.		1875.		1876.		1877.		1878.		1879.		1880.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
New Brunswick.....	1,147	277,850	1,144	294,741	1,133	307,926	1,154	324,513	1,133	329,457	1,142	335,965	1,135	340,491	1,097	336,976
Nova Scotia.....	2,803	449,701	2,787	479,669	2,786	505,144	2,867	523,252	2,961	541,579	3,043	553,368	2,975	552,159	2,977	550,448
Quebec.....	1,842	214,063	1,837	218,946	1,831	222,965	1,902	228,502	1,951	248,369	1,676	248,349	1,975	246,925	1,899	233,341
Ontario.....	681	89,111	815	113,008	825	114,990	880	123,947	926	131,761	958	135,440	1,046	136,987	1,042	137,481
P. E. Island.....	280	38,918	312	48,388	335	50,677	338	50,692	342	55,547	322	54,250	298	49,807	288	43,431
British Columbia.....	30	4,066	35	3,611	2	3,685	40	3,809	43	3,479	51	4,482	60	4,701	63	5,049
Manitoba.....					2	178	2	178	6	246	17	1,161	22	1,924	21	1,992
Total.....	6,783	1,073,718	6,930	1,158,363	6,952	1,205,565	7,192	1,260,893	7,362	1,310,468	7,469	1,333,015	7,471	1,332,064	7,377	1,311,218
	1881.		1882.		1883.		1884.		1885.		1886.		1887.		1888.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
New Brunswick.....	1,087	333,215	1,065	308,980	1,107	315,906	1,096	308,132	1,040	288,589	1,042	269,224	1,027	255,126	1,009	230,332
Nova Scotia.....	3,025	588,911	3,026	646,778	3,037	541,715	2,942	544,048	2,988	541,832	2,929	526,921	2,845	498,878	2,851	486,709
Quebec.....	1,830	224,936	1,754	215,804	1,739	216,577	1,628	202,842	1,631	203,635	1,650	232,556	1,586	189,064	1,498	178,530
Ontario.....	1,081	139,998	1,112	137,061	1,133	140,972	1,184	142,387	1,223	144,487	1,248	140,929	1,275	139,548	1,330	139,502
P. E. Island.....	273	45,410	248	41,684	241	49,446	234	39,213	227	36,040	225	30,658	225	29,031	218	26,886
British Columbia.....	74	6,286	84	7,687	94	9,046	116	11,403	123	11,834	134	11,900	149	12,789	167	14,249
Manitoba.....	24	2,130	23	2,783	24	2,778	55	5,722	63	5,439	65	5,378	71	5,811	69	5,744
Total.....	7,394	1,310,806	7,312	1,260,777	7,374	1,276,440	7,264	1,253,747	7,315	1,231,856	7,294	1,217,766	7,178	1,130,247	7,142	1,089,042

COMPARATIVE STATEMENT showing the Number of Vessels and Number of Tons on the Registry Books, &c.—*Concluded.*

Provinces.	1889.		1890.		1891.		1892.		1893.		1894.		1895.		1896.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
New Brunswick	1,013	218,873	981	209,460	969	193,193	946	181,779	1,010	156,086	1,003	136,237	975	122,417	964	115,506
Nova Scotia	2,855	464,431	2,793	464,194	2,778	461,758	2,731	425,690	2,715	396,263	2,710	371,432	2,683	343,356	2,669	317,526
Quebec	1,455	168,500	1,399	164,003	1,404	162,330	1,408	162,638	1,426	161,121	1,427	160,590	1,454	158,776	1,469	158,649
Ontario	1,352	141,839	1,312	138,738	1,345	138,914	1,347	141,750	1,370	146,665	1,480	148,525	1,508	148,609	1,525	146,522
P. E. Island	224	26,506	231	26,080	195	23,316	196	22,706	188	20,970	191	19,650	190	19,323	174	16,540
British Columbia	176	15,241	196	16,024	246	19,767	298	23,448	315	24,900	330	26,455	346	25,988	363	26,622
Manitoba	77	6,091	79	6,475	78	6,197	81	6,118	89	6,534	98	6,715	106	7,307	115	7,934
Total	7,153	1,040,481	6,991	1,024,974	7,015	1,005,475	7,007	964,129	7,118	912,539	7,245	869,624	7,262	825,836	7,279	789,299

LIST of Ports at which Vessels may be Registered, showing the Number of New Vessels Built and Registered in the Dominion of Canada, during the Year ended 31st December, 1896.

PROVINCE OF NEW BRUNSWICK.

Name of Port.	Total Number of Sailing Ships and Steamers.	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
Chatham.....	16	1	19	216
Dorchester.....				
Moncton.....				
Richibucto.....				
Sackville.....	2			164
St. Andrews.....	2			22
St. John.....	4	1	10	225
Total.....	24	2	29	627

NOVA SCOTIA.

Amherst.....	1			11
Annapolis.....	2			256
Arichat.....	1			10
Barrington.....				
Canso.....				
Digby.....	2			114
Guysboro'.....				
Halifax.....	13	1	35	203
Liverpool.....	6	1	41	5-0
Lunenburg.....	22			1,901
Maitland.....				
Parrsboro'.....	12			2,432
Pictou.....	2			11
Port Hawkesbury.....	5			256
Port Medway.....				
Pugwash.....	8			634
Shelburne.....	6	1	45	308
Sydney.....	1			51
Truro.....				
Weymouth.....	4			406
Windsor.....	4			246
Yarmouth.....	8	2	88	315
Total.....	97	5	209	7,704

QUEBEC.

Amherst, M.I.....	1			8
Gaspé.....				
Montreal.....	15	6	1,819	3,074
New Carlisle.....	1			13
Perce'.....				
Quebec.....	19			874
Total.....	36	6	1,819	3,969

ONTARIO.

Amherstburg.....	3	3	36	23
Belleville.....	1	1	13	9
Bowmanville.....				
Brockville.....	3	3	12	9
Chatham.....				
Chippewa.....				
Cobourg.....				

List of Ports at which Vessels may be Registered, showing the Number of New Vessels Built and Registered, &c.—Continued.

ONTARIO—Concluded.

Name of Port.	Total Number of Sailing Ships and Steamers.	Number of Steamers.	Gross Tonnage of Steamers.	Total Net Tonnage of Sailing Ships and Steamers.
Collingwood.....	2	2	74	50
Cornwall.....	1	1	20	13
Cramahe.....				
Deseronto.....				
Dunnville.....				
Goderich.....				
Hamilton.....	1	1	24	13
Kingston.....	2	2	230	102
Morrisburg.....				
Napanee.....				
Oakville.....				
Ottawa.....	21	16	742	804
Owen Sound.....				
Pictou.....				
Port Arthur.....				
Port Burwell.....	2	1	16	56
Port Colborne.....				
Port Dover.....				
Port Hope.....				
Port Rowan.....				
Port Stanley.....				
Prescott.....				
Sarnia.....				
Saugeen.....				
Sault Ste. Marie.....				
St. Catharines.....				
Toronto.....	2	2	1,277	678
Wallaceburg.....				
Whitby.....				
Windsor.....				
Total.....	38	32	2,444	1,757

PRINCE EDWARD ISLAND.

Charlottetown.....	3			111
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BRITISH COLUMBIA.

New Westminster.....	10	10	1,267	762
Vancouver.....	5	4	59	68
Victoria.....	7	3	634	636
Total.....	22	17	1,960	1,466

MANITOBA.

Winnipeg.....	7	7	716	512
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SUMMARY.

New Brunswick.....	24	2	29	627
Nova Scotia.....	97	5	209	7,704
Quebec.....	36	6	1,819	3,969
Ontario.....	38	32	2,444	1,757
P. E. Island.....	3			111
British Columbia.....	22	17	1,960	1,466
Manitoba.....	7	7	716	512
Grand total.....	227	69	7,177	16,146

COMPARATIVE STATEMENT of New Vessels Built and Registered in the Dominion of
both

Provinces.	1874.		1875.		1876.		1877.		1878.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
New Brunswick.....	90	42,027	65	33,483	61	31,040	54	31,158	56	27,368
Nova Scotia.....	175	84,480	177	67,106	194	58,771	219	47,980	165	49,784
Quebec.....	73	20,796	103	22,825	51	17,800	62	19,253	46	10,870
Ontario.....	50	10,797	53	7,760	47	5,397	28	3,316	30	2,409
Prince Edward Island.....	88	24,634	83	19,838	62	14,571	62	17,026	38	10,382
British Columbia.....	5	276			1	121	2	204	2	45
Manitoba.....							3	48	1	15
Add new vessels built in Can- ada which proceeded to the United Kingdom under a Governor's pass without being registered.....	490	183,010	480	151,012	416	127,700	430	118,985	339	100,873
Add new vessels which left Quebec for registration in Germany.....	6	7,746			3	2,721	2	1,943	1	663
Total.....	496	190,756	480	151,012	420	130,901	432	120,928	340	101,536

	1886.		1887.		1888.		1889.		1890.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
New Brunswick.....	34	4,931	18	2,909	32	2,530	50	4,792	35	5,572
Nova Scotia.....	93	20,948	87	12,310	116	12,965	126	19,645	150	33,907
Quebec.....	27	2,683	28	2,888	23	2,669	27	3,759	25	4,880
Ontario.....	52	2,075	66	2,993	62	5,095	45	3,259	41	4,917
Prince Edward Island.....	12	1,318	7	601	12	1,412	12	1,503	12	2,008
British Columbia.....	8	154	9	376	18	448	12	840	15	876
Manitoba.....	3	98	8	439	1	11	8	548	7	218
Add new vessels built in Can- ada which proceeded to the United Kingdom under a Governor's pass without being registered.....	229	32,207	224	22,516	264	25,130	280	34,346	285	52,378
Add new vessels which left Quebec for registration in Germany.....										
Total.....	229	32,207	224	22,516	264	25,130	280	34,346	285	52,378

Canada during the Year ended 31st December, in each year from 1874 to 1896, inclusive.

1879.		1880.		1881.		1882.		1883.		1884.		1885.	
Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
43	19,067	63	18,896	57	18,259	66	16,820	72	21,103	46	12,888	34	7,736
126	39,208	126	31,257	150	40,465	117	26,711	202	35,765	178	42,032	102	24,703
29	7,421	33	8,219	56	5,673	26	6,785	42	6,594	32	3,815	29	4,556
42	2,464	44	3,610	54	5,111	55	4,369	34	4,311	58	4,446	45	4,509
20	5,279	21	3,359	15	4,351	15	3,508	17	5,343	21	5,189	11	1,707
5	788			2	85	8	1,631	5	849	15	675	6	648
...	...	1	100	3	116	1	289	2	125	37	3,366	13	320
265	74,227	271	65,441	336	74,060	288	60,113	374	74,090	387	72,411	240	43,179
...	...	...	...	...	...	1	1,029	...	...	...	...	...	...
265	74,227	271	65,441	336	74,060	288	61,142	374	74,090	387	72,411	240	43,179

1891.		1892.		1893.		1894.		1895.		1896.	
Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
43	6,269	21	1,873	119	2,819	40	2,534	27	714	24	627
130	35,528	105	16,446	111	15,089	128	8,721	89	4,762	97	7,704
46	4,200	34	2,620	53	4,220	55	4,412	49	4,335	36	3,969
44	2,662	34	3,684	49	4,126	64	3,137	52	3,732	38	1,757
5	1,000	9	967	3	634	3	183	1	196	3	111
41	2,364	46	2,887	19	944	25	1,900	18	1,709	22	1,466
3	122	6	296	8	608	11	356	14	822	7	512
312	52,145	255	28,773	362	28,440	326	21,243	250	16,270	227	16,146
...
312	52,145	255	28,773	362	28,440	326	21,243	250	16,270	227	16,146

STEAMBOAT INSPECTION AND CERTIFICATES TO ENGINEERS.

The annual report for the year 1896 of the chairman of the board of inspection forms an appendix to this report. The statement showing certificates granted to engineers of steamboats, together with a list of steam vessels inspected and steam vessels not inspected, number of passengers allowed to be carried in each passenger steamboat, steam vessels added to the list, and steamers lost or laid up or rendered unfit for service during the year, will be printed in the supplement.

The amount received during the last fiscal year on account of tonnage dues, inspection of steamboats and certificate to engineers was \$23,205.67, of which the sum of \$22,488.17 was for tonnage dues and inspection fees, and \$717.50 for certificates to engineers. The expenditure for the fiscal year amounted to \$26,321.27, showing an excess of expenditure over the receipts of \$3,115.60.

The following is a comparative statement of the receipts and expenditure:—

			Receipts.	Expenditures.
			\$ cts.	\$ cts.
For the fiscal year ended 30th June, 1870.			12,521 29	7,379 18
do do 1871.			10,369 96	8,321 00
do do 1872.			11,710 43	8,500 00
do do 1873.			15,412 75	11,205 54
do do 1874.			15,603 19	10,291 58
do do 1875.			15,011 90	12,199 81
do do 1876.			13,811 24	13,081 86
do do 1877.			15,858 42	12,073 01
do do 1878.			12,431 25	13,228 28
do do 1879.			12,331 16	13,076 46
do do 1880.			15,424 02	11,854 34
do do 1881.			16,905 49	12,211 65
do do 1882.			15,277 78	14,835 97
do do 1883.			12,577 36	16,209 02
do do 1884.			15,371 79	21,893 28
do do 1885.			13,343 66	23,235 04
do do 1886.			14,087 76	21,775 57
do do 1887.			12,701 20	22,837 80
do do 1888.			12,550 14	21,430 45
do do 1889.			12,576 18	22,313 03
do do 1890.			19,859 18	20,989 52
do do 1891.			21,644 72	22,183 76
do do 1892.			20,994 84	22,736 59
do do 1893.			25,295 35	24,386 95
do do 1894.			24,835 47	25,961 36
do do 1895.			24,630 56	26,385 88
do do 1896.			24,002 32	26,321 27
			437,188 32	467,938 20
Deduct receipts from expenditure.				437,188 32
Balance to debit of fund				30,749 88

The following list contains the names of the inspectors of boilers and machinery and hulls and equipment of steamboats, viz:—

Name.	Position.	Address.
Edward Adams.....	Chairman of Board of Steamboat Inspection.....	Ottawa.
M. P. McElhinney.....	Inspector of Hulls and Equipments.....	do
I. J. Olive.....	do do.....	St. John, N.B.
S. R. Hill.....	do do.....	Halifax, N.S.
William Evans.....	do do.....	Toronto, Ont.
Thos. Donnelly.....	do do.....	Kingston, Ont.
P. D. Brunelle.....	do do.....	Quebec.
R. Collister.....	do do.....	Victoria, B.C.
John Dodds.....	Inspector of Boilers and Machinery.....	Toronto, Ont.
J. Johnson.....	do do.....	do
T. P. Thompson.....	do do.....	Kingston, Ont.
Wm. Laurie.....	do do.....	Montreal, P.Q.
L. Arpin.....	do do.....	do
J. Sampson.....	do do.....	Quebec, P.Q.
J. P. Esdaile.....	do do.....	Halifax, N.S.
H. L. Waring.....	do do.....	St. John, N.B.
J. A. Thompson.....	do do.....	Victoria, B.C.
G. P. Phillips.....	do do.....	Rat Portage, Ont.

INSIDE SERVICE.

The following comprises the names of officials and employees, engaged in the inside service of the Department of Marine and Fisheries on the 30th June, 1896.

Name.	Rank.	Salary.
		\$ cts.
William Smith.....	Deputy Minister, 10 months.....	3,000 00
F. Gourdeau.....	do 2 months.....	533 33
John Hardie.....	Chief Clerk.....	2,400 00
F. Gourdeau.....	Accountant, 10 months.....	1,911 70
E. E. Prince.....	Commissioner of Fisheries.....	2,000 00
<i>Technical Officers.</i>		
W. P. Anderson.....	Chief Eng., General Supt. Lighthouses and Hydrographic Service.	2,600 00
W. Bell Dawson.....	.....	2,050 00
W. J. Stewart.....	.....	1,700 00
C. F. Cox.....	.....	1,400 00
B. H. Fraser.....	.....	1,100 00
F. Anderson.....	.....	750 00
J. M. O'Hanly.....	.....	1,100 00
<i>Other Officials.</i>		
W. H. Alexander.....	First class Clerk.....	1,650 00
M. P. McElhinney.....	do.....	1,650 00
A. W. Owen.....	do.....	1,550 00
C. Stanton.....	do.....	1,550 00
J. S. Webster.....	do.....	1,400 00
M. F. Walsh.....	do.....	1,400 00
S. B. Kent.....	Second class Clerk.....	1,400 00
J. B. Halkett.....	do.....	1,400 00
A. H. Belliveau.....	do.....	1,400 00
W. W. Stumbles.....	do.....	1,350 00
V. H. Steel.....	do.....	1,350 00
A. Halkett.....	do.....	1,250 00
F. H. Cunningham.....	do.....	1,250 00
J. A. Murray.....	do.....	1,100 00
T. Aumond.....	Third class Clerk.....	1,000 00
J. McClenaghan.....	do.....	1,000 00
D. C. Campbell.....	do.....	1,000 00
R. Roy.....	do.....	980 00
B. F. Burnett.....	do.....	950 00
M. C. Doyle.....	do.....	900 00
W. A. Mackinson.....	do.....	800 00
A. H. Guion.....	do.....	850 00
J. W. Watson.....	do.....	650 00
J. M. Lalonde.....	do.....	650 00
E. W. Gilbert.....	do.....	600 00
C. W. White.....	do.....	500 00
John McCharles.....	do.....	500 00
J. J. Skelly.....	do.....	400 00
R. Beaulieu.....	do.....	400 00
J. Morin.....	Messenger.....	500 00
R. Archambault.....	do.....	500 00
E. McQuarrie.....	do.....	330 00
M. D. Kelly.....	do.....	300 00

EXTRA CLERKS.

M. Lamouche \$ 2.25 per diem.
 R. E. Tyrwhitt .. 600.00 per annum.
 W. L. Bance..... 450.00 do

OUTSIDE SERVICE, MARINE BRANCH.

The number of persons employed in the outside service on the 30th June, 1896, was as follows :—

Superintendent of lights and light-keepers, etc., in Ontario and above Montreal.....	175
Officers of agency in the city of Quebec and light-keepers, fog whistle-keepers, crews of light-ships, etc., at and below Montreal, in the province of Quebec.....	173
Agent, clerk, messenger, superintendent of lights, light-keepers, fog-whistle keepers, attendants at humane establishments, etc., in Nova Scotia.....	205
Agent, clerk, messenger, superintendent of lights, light-keepers, fog-whistle keepers, etc., in New Brunswick.	107
Agent, foreman of works, messenger and light-keepers in Prince Edward Island.....	43
Agent and light-keepers in British Columbia.....	16
Officers and crews of Dominion steamers and vessels, including Fisheries Protection Service.....	360
Coxswains of life-boats.....	25
Inspectors of steamboats.....	20
do shipments of live stock.....	3
Examiners of masters and mates, and clerk to chairman of Board.....	17
Officers and servants in marine hospitals.....	23
Shipping masters.....	35
Harbour masters.....	198
Officers of observatories, meteorological observers, etc., receiving pay.....	149
Hydrographers and engineers at Ottawa.....	7
Receivers of wrecks.....	45
Wharfingers.....	135
Making a total of.....	<u>1,736</u>

For the previous year the number was 1,679. In addition to the 1,736 mentioned above there were 70 registrars of shipping, who act under the direction and control of this department, but are, at the same time, collectors of customs at various ports of registration, and receive no salary or fee in their capacity of registrars. There are 93 measurers and surveyors of shipping throughout the Dominion, who act as officers of this department, and are remunerated from their fees of office, although in addition to such office, many of them hold positions in the customs service. Also, in addition to the above, by Orders in Council of the 21st of April and 2nd of December, 1874, the chief officer of customs at each port in the provinces of Quebec, Nova Scotia, New Brunswick, British Columbia and Prince Edward Island, where no separate shipping office has been established, is to be held and deemed a shipping master, is to receive the fees, make the yearly returns to the department, and act in that capacity under its directions.

From the above statement it will be seen that there are 149 officers of observatories, etc., who receive pay for the performance of their duties, but in addition thereto there is a large number of meteorological observers throughout the Dominion who give their services gratuitously.

METEOROLOGICAL SERVICE.

Mr. Stupart, director, in his report states that the usefulness of the service has been increased in several directions. A monthly map has been published during the past year, and meteorological data supplied the director of the Tidal Survey. In addition to the publication of weather forecasts furnished to leading newspapers of the Dominion, besides being posted at about 1,500 telegraph offices in Manitoba, Ontario, Quebec and the Maritime Provinces, a bulletin has been telegraphed each morning at 10.15 to harbour masters and other persons on the lakes and Maritime Provinces. The bulletins have proved very useful and are now posted in about thirty different ports. By reference to the director's report it will be seen that seafaring men and fishermen appreciate the forecasts, and are governed by them to a large extent when storms are predicted.

The demand from persons in Toronto, and at a distance, for special forecasts continue to increase, and in all cases predictions have been furnished at once to those asking for them. Warnings of approaching storms were issued to railways.

The average number of inquiries regarding the weather, by telephone at the Toronto office, is about six per day. The number of inquiries by telegraph regarding the weather, from outside places in direct telegraphic communication with the Toronto office, is about ten per week.

Forty-four stations with voluntary observers were added during the year, making a total of 236.

No charge is made in Canada for inquiries.

The information relating to forecasts is given to the public gratuitously, and a display is made in conspicuous and public places in the various cities of the Dominion, of the forecasts.

MAGNETIC OBSERVATORIES.

The annual reports of the director of the Magnetic Observatory at Toronto, and the observatories at Quebec, Montreal, Kingston and St. John, are annexed to the report on the Meteorological Service. The sum of \$2,747 was expended in connection with the Magnetic Observatory at Toronto, and \$500 each for the observatories at Kingston and Montreal. The total amount expended on account of meteorological and magnetic services for the past fiscal year was \$66,600.29.

COASTING TRADE OF CANADA.

By the provisions of chapter 83, Consolidated Statutes of Canada, being an Act respecting the Coasting Trade of Canada, no goods or passengers can be carried by water from one port in Canada to another except in British ships, but the Governor

in Council may, from time to time, declare that the Act shall not apply to ships or vessels of any foreign country in which British ships are admitted to the coasting trade of such country, and to carry goods and passengers from one port or place to another in such country. The Parliament of Canada was empowered to pass the Act alluded to under the provisions of the Imperial Act, 32 Vic., chap. 11, intituled : "An Act for amending the Law relating to the Coasting Trade and Merchant Shipping in British Possessions," which came into operation in this country on its proclamation by the Governor General on the 23rd October, 1869.

It was ascertained that the following countries, viz., Italy, Germany, the Netherlands, Sweden and Norway, Austro-Hungary, Denmark, Belgium and the Argentine Republic, allowed British ships or vessels to participate in their coasting trade on the same footing as their own national vessels—the ships of Italy by Order in Council of the 13th August, 1873; those of Germany by Order in Council of the 14th May, 1874; those of the Netherlands by Order in Council of the 9th September, 1874; those of Sweden and Norway by Order in Council of the 5th November, 1874; those of Austro-Hungary by Order in Council of the 1st June, 1876; those of Denmark by Order in Council of the 25th January, 1877; those of Belgium by Order in Council of the 30th September, 1879; and those of the Argentine Republic by Order in Council of the 18th May, 1881, were admitted to the coasting trade of Canada.

INSPECTION OF SHIPMENTS OF LIVE STOCK EXPORTED FROM CANADA.

A report from the inspectors forms an appendix to this report. It will be seen that the total number of cattle shipped in 1896 is greater than for the year 1895, the figures being 96,448 cattle for 1896, and 94,972 cattle for 1895.

MESSENGER PIGEONS.

The pigeons were removed from Halifax to Hazelhill in Guysboro' County, in December of last year, and placed under the control of Mr. S. S. Dickinson, Supt. of the Commercial Cable Company. This change was made in order that the flight might be reduced for the birds between the mainland and Sable Island, and that the experiment with the birds may be conducted under the most favourable circumstances. The pigeons have increased in number by careful attention, and it has been found necessary to enlarge the pigeon loft to accommodate the young birds. No experiments in flying were made as the birds hatched at Hazelhill are too young to train this season.

REMOVAL OF OBSTRUCTIONS TO NAVIGATION.

The sum of \$5,000 was appropriated by Parliament for the removal of obstructions to navigation. The sum of \$456.38 was expended.

The schooner "Marie Rose" was sunk in the channel at the mouth of Grand Pabos Harbour, Gaspé Co., Quebec. Tenders were invited and the work of removal was done by contract in a satisfactory way.

CORRESPONDENCE.

The correspondence of the Marine branch has steadily increased from year to year. The letters received during the financial year number about 13,000, not including returns from officers and accounts. The letters sent out numbered about 13,200, not including more acknowledgments.

LONGITUDE OF MONTREAL.

By reference to reports of previous years it will be seen that arrangements were made for determining the longitude of Montreal. The matter is one of importance and is necessary for the construction of reliable hydrographic and other charts. The report of Professor C. H. McLeod, Superintendent of McGill College Observatory, published as part of Appendix No. 4, contains information respecting the final value of the longitude of Montreal. The following is an extract from the report:

"During the past summer the Astronomer Royal visited Montreal on his way from Japan, having brought with him the completed reductions of Montreal—Greenwich longitude observations, I am able to announce the final value of the longitude of Montreal (the middle point between the two piers of the transit instruments at this observatory) as determined from the observations of Professor H. H. Turner and myself in 1892, as $4^{\text{h}} 54^{\text{m}} 18^{\text{s}}.670$. This quantity is in excess of the old value which was obtained by connection with the United States system of longitudes by $0^{\text{s}}.105$."

I have the honour to be, sir,
Your most obedient servant,

F. GOURDEAU,
Deputy Minister of Marine and Fisheries.

DEPARTMENT OF MARINE AND FISHERIES,
April, 1896.

APPENDIX No. 1.

GENERAL SUMMARY of Expenditure for Fiscal Year ended 30th June, 1896.

Service.	Amount.	Total.
	\$ cts.	\$ cts.
Ocean and River—		
Maintenance and repairs, Dominion steamers.....	150,519 41	
Examination masters and mates.....	4,062 82	
Rewards for saving life.....	8,004 38	
Investigations into wrecks.....	483 98	
Registry of shipping.....	517 60	
Tidal service.....	9,627 45	
Removal of obstructions in navigable rivers.	456 38	
Winter mail service.....	7,779 69	
		181,451 71
Lighthouse and Coast—		
Salaries and allowance lightkeepers.....	199,348 61	
Agencies, rents and contingencies.....	15,372 14	
Maintenance and repairs to lights.....	225,691 07	
Construction of lights.....	17,662 28	
Signal service.....	5,338 76	
Repairs to wharfs.....	2,644 69	
		406,057 55
Scientific Institutions—		
Observatory, Toronto.....	2,747 97	
do Kingston.....	500 00	
do Montreal.....	500 00	
Meteorological service.....	62,852 32	
Hydrographic surveys.....	15,099 63	
		81,699 92
Marine Hospitals—		
St. Catharines hospital.....	320 40	
Sick and disabled seamen.....	33,313 17	
Shipwrecked and distressed seamen.....	3,049 79	
		36,683 36
Steamboat inspection.....		26,321 27
Salaries, &c., of Fisheries, Overseers and Wardens—		
Ontario.....	24,917 48	
Quebec.....	11,870 43	
New Brunswick.....	20,526 56	
Nova Scotia.....	23,049 41	
Prince Edward Island.....	3,555 87	
Manitoba.....	3,852 18	
North-west Territories.....	2,963 02	
British Columbia.....	6,226 77	
		96,961 72
Fish breeding.....		38,050 41
Fishery protection service.....		107,317 21
Miscellaneous—		
Building fishways.....	1,722 40	
Legal expenses.....	4,982 24	
Canadian fisheries exhibit.....	149 14	
Distributing bounty.....	4,951 05	
Oyster culture.....	5,143 68	
Carried forward.....	16,948 51	1,034,543 15

GENERAL SUMMARY of Expenditure for Fiscal Year ended 30th June, 1896—*Continued.*

Service.	Amount.	Total.
	\$ cts.	\$ cts.
Brought forward	16,948 51	1,034,543 15
Miscellaneous— <i>Continued.</i>		
International fisheries commission	1,945 69	
Edward Hackett	214 40	
W. B. Deacon	93 15	
Licenses to United States fishing vessels	278 55	
Samuel Wilmot	45 55	
A. L. Belyea	577 40	
Refund bait licenses to Newfoundland fishermen	1,250 00	
		21,333 25
Fishing bounty		163,567 99
Civil Government, salaries	62,476 73	
do contingencies	8,226 98	
		70,703 71
		1,290,168 10

APPENDIX No. 2.

**STATEMENT of Revenue of Marine and Fisheries Department for the Fiscal Year
ended 30th June, 1896.**

Service.	Amount.
	\$ cts.
Casual Revenue (sale of shipping forms, \$134 ; sundries, \$5,788.19)	5,922 19
Capes mail service	357 08
Dominion steamers	11,056 94
Examinations masters and mates	3,393 00
Fines and forfeitures	530 71
Harbours, piers and wharfs	7,943 24
Cattle inspection	4,731 49
Steamboat engineers' certificates	827 50
	34,762 15

F. GOURDEAU,
Deputy Minister of Marine and Fisheries.

A. W. OWEN,
Accountant.

APPENDIX No. 3.

ANNUAL REPORT OF THE CHIEF ENGINEER OF THE DEPARTMENT OF MARINE AND FISHERIES.

Major F. GOURDEAU,
Deputy Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit a report of the work done by the various branches under my control during the past year. This includes all the technical work at the department's headquarters, embracing the construction and maintenance of lighthouses, lightships, fog-alarms, buoys and beacons, the supervision of construction and repairs to Dominion steamers, construction and repairs of life boats and life boat stations; the administration of the vote for the removal of wrecks and obstructions in navigable waters; tidal and current surveys; hydrographic surveys in Canadian waters, and the publication, examination and correction of hydrographic charts; construction and repairs to fish hatcheries; engineering points in connection with the maintenance of fish passes; supervision of surveys of oyster beds; examination of applications for foreshore, wharf and water lots as they affect the interests of navigation; preparation and publication of notices to mariners and hydrographic notes, etc.

There are special staffs appointed for the tidal observation work and for the hydrographic survey work; the remainder of the work of the branch is attended to by the general staff of the office.

AIDS TO NAVIGATION.

A large proportion of the work done by this general staff consists in the construction and maintenance of light buildings and other aids to navigation. Full details of the large quantity of work done in this connection last year are contained in the annual report of the Deputy Minister. Plans and specifications for all important new buildings and repairs are made or supervised in Ottawa.

Attention is drawn to the notices to mariners issued last year, which covered a large variety of subjects of interest to Canadian mariners, and involve considerable correspondence and office work. In consequence of our small staff it is found necessary generally to limit these notices to purely Canadian topics, though some effort is made to include improvements in contiguous waters. I should like to see the work more thoroughly done, but doubt if it can be accomplished without detailing an officer for that special duty. The list of Canadian lights and fog signals has been brought up to date, and, as revised, has been printed.

An important work which it has been impossible to attempt is the compilation and publication of a list of Canadian buoys and beacons.

The following table gives a synopsis of the office work accomplished during the year 1896:—

Land surveys	21	Plans received.	3	Plans designed.	52	Copies made.
Lighthouse towers and dwellings.....	3	"	10	"	24	"
Wharfs, piers, &c.....	8	"	1	"	6	"
Fog-alarms.....			2	"	3	"
Outbuildings.....			2	"	2	"
Detail sheets.....			1	"	6	"
Illuminating apparatus.....	6	"			1	"
Steamers.....	2	"			2	"
Buoys and apparatus.....	8	"			7	"
Boilers and fittings.....	13	"	1	"	1	"
Machinery.....	2	"	1	"	2	"
Oyster areas.....					1	"
Charts.....	1	"	1	"	3	"
Charts under construction			1	"		
Miscellaneous.....	27	"	1	"	50	"
Total drawings and copies passing through office.....						275
Charts received and recorded.....						80
do entered in chart books.....						22
Photographs received and recorded.....						22
Plans relating to foreshore applications received and made.....						44
Specifications written.....						15
Notices to mariners issued (comprising 135 subjects).....						70

As funds permit an endeavour is being made to improve the characters of the buildings and foundations by substituting more durable materials and more compact designs for those previously in use. In consequence of the progressively increasing price of square timber and deterioration in the quality of that made, timber cribwork foundations are no longer desirable, and in many instances I have been able to substitute for the old cribwork piers, steel casings filled with rough and cheap concrete and stonework. The initial cost is not much greater than that of good cribwork, while there is no comparison in the strength and durability of the two classes of structure. Where such a design proves suitable, light angle iron frame towers have been substituted for the heavy square timber framework previously used and the results of this change are satisfactory. In consequence of the extreme cheapness of steel, there is no appreciable increase of cost in making the change from wood to iron in this case.

PERSONAL INSPECTIONS.

In July last, I accompanied the agent for Prince Edward Island on his annual supply trip to light stations on the north shore of his division, and had an opportunity of seeing the difficulties to be contended with from shifting sandbars on that coast, a condition which will always make it difficult to establish successful and permanent lights.

In July and August, I accompanied the inspector on his summer supply trip to lights in the Strait of Belle Isle and made a careful inspection of all the stations in the Gulf of St. Lawrence. The lights, with very few exceptions, were exceptionally well kept and exceptionally well supplied. In the supply of coal too large a reserve was maintained, subjecting the coal to deterioration by age, and a change in the method of supplying this article is recommended. At various times I was enabled to visit and survey proposed sites for new lights, and attention is drawn to the desirability in all cases of allowing the officer who is entrusted with the preparation of plans the opportunity of inspecting the sites and locating the buildings beforehand. By so doing the proper location of the lighthouse and the proper adaptation of the plans to the site can be ensured.

TIDAL OBSERVATION WORK.

During the past summer season Mr. Dawson, C.E., continued the work of observing tides and currents in the Gulf of St. Lawrence with the assistance of the Dominion steamer "Lansdowne" as in previous years. Annexed hereto—

Inclosure B—is his report of progress for the season. It is to be regretted that the funds available for this work will necessitate a restriction of the work during the coming season. The work already done has been very satisfactory, and the results obtained have been valuable, not only from a scientific standpoint but also directly and practically to masters navigating the Gulf.

HYDROGRAPHIC SURVEYS.

The only hydrographic survey work directly under the control of the government of Canada is that done by Mr. Stewart on Lake Erie. I submit herewith—Inclosure A—Mr. Stewart's report of progress for the past year. It is hoped that the survey of the north shore of Lake Erie will be completed and connected with the American work early next season, and it is proposed that Mr. Stewart should resume the survey of Lake Huron for the remainder of the season of 1897. Besides the work done directly by this department, in hydrographic surveying, considerable additions to surveys of Canadian waters were made during the past season. The banks off Halifax were surveyed by H. M. S. "Rambler," and a resurvey of Louisbourg was made by the same vessel. The results of these surveys will be published by the Admiralty. A resurvey of the North Sydney bars was undertaken by the commissioners of that port and the results have been sent to the Admiralty for correction of the harbour chart.

From time to time the master of the Dominion steamer "Quadra" has been enabled to make some small surveys in British Columbia waters, the results of which have been embodied in Admiralty charts, and in notices to mariners issued by this department.

Respectfully submitted,

WM. P. ANDERSON,
Chief Engineer.

2nd JANUARY, 1897.

[Inclosure A.]

REPORT OF PROGRESS.

HYDROGRAPHIC SURVEY OF LAKE ERIE.

W. P. ANDERSON, Esq.,
Chief Engineer,
Department of Marine and Fisheries.

In connection with the survey under my charge I have the honour to report as follows upon the operations during the past year. Last winter was fully taken up in plotting and otherwise working up the notes of the previous season's work, as well as in the preparation of copies for the Hydrographer of the Admiralty, London, England, and also one for the Hydrographer of the United States Navy.

The first chart of the Canadian shore of Lake Erie will embrace that portion from Port Colborne to Port Rowan, including Long Point, and will probably be published on a scale of $\frac{1}{10}$ of an inch to one mile. These copies will be completed early this winter.

On May 6th the extensive repairs to the "Bayfield," having been completed at Port Dalhousie, and the errors of the vessel's compasses ascertained by "swinging" off the same place, I proceeded up the Welland Canal and started work at Port Colborne on the 7th. The whole season after that was taken up with work between

Port Dover and Rondeau Harbour. This has been thoroughly sounded to an average distance of ten nautical miles from shore. The boat soundings were taken out one mile and the balance of the distance sounded from the deck of the steamer to a depth of about twelve fathoms. No important shoals were found in the whole area surveyed, in fact the shore was found to be free from dangers. The area surveyed was 800 square miles; number of nautical miles of shore line traversed was 100; number of miles sounded from boats 1,000, and number from the steamer 1,500.

Owing to the character of the shore, I was unable to carry on a regular triangulation from Houghton Sand Hills to Rondeau, a distance of 60 nautical miles, but had to resort to a system of buoys for the apexes of the triangles. As the sides of the triangles were from 7 to 17 miles long, the buoys moored very short and the observing done at, at least, six stations on a calm clear day, very little error crept in. As a check, a "broken base" of about six miles was measured near Rondeau, and its agreement with the same side calculated from the triangulation was satisfactory. Instead of, as hitherto, using a compass to ascertain the magnetic declination at various points on the shore of the lake, through the kindness of Mr. Stupart, of the meteorological service, who lent me a unifilar magnetometer, I was enabled to accurately ascertain the declination at Rondeau, Long Point and Port Colborne. I am much pleased that in future a similar instrument is to be available for my use and that better results will follow in this line.

A great deal of inconvenience was encountered through lack of harbours, there being really no good harbour between Long and Pelee Points. I had my headquarters at Port Stanley, which is only a very narrow cut between piers with barely enough water to allow the "Bayfield" to enter in fine weather. In foul weather the entrance is unsafe. Rondeau is only a little better, as a couple of vessels can lie with safety, but no more.

On the whole the weather was favourable for hydrographical surveying. We had some heavy gales in May, one in July and one in September, but with these exceptions the winds were moderate and the air tolerably clear.

The water on the lakes has at least not shown any inclination, during the past season, to drop lower than during its predecessor, but has rather improved, owing probably to the fact that we had far more rain in the summer of 1896 than in 1895. It is sincerely to be hoped that the improvement will continue.

I am glad to say as a result of the recent survey of Georgian Bay, the British Admiralty have just issued a complete chart of that water, on a scale of $\frac{3}{8}$ inch to one nautical mile. This should prove an extremely useful help to vessels using that bay.

On October 16th, I left Lake Erie to examine some reported dangers in the north channel of Lake Huron. These were accurately located and the results published in a notice to mariners. Any existing charts that come to hand will have these corrections inserted and the Hydrographer of the Admiralty will be able, from tracings, to have the corrections placed on all new prints.

On October 24th, I reached Collingwood and placed the "Bayfield" on dry dock for some minor necessary repairs. She is now laid up at Owen Sound.

There have been no changes in the staff of the survey, or in the officers of the "Bayfield" during the past season.

With fairly good weather the survey of the Canadian shore of Lake Erie, from Port Colborne to Pelee Point should be completed by the first of September. The balance of the Canadian shore was surveyed by the United States government about twenty years ago, and as no complaints have been made about shoals left out, there seems no necessity for a resurvey.

I have the honour to be, sir,

Your obedient servant,

WM. J. STEWART.

[Inclosure B.]

REPORT OF PROGRESS.

SURVEY OF TIDES AND CURRENTS IN CANADIAN WATERS.

OTTAWA, 26th January, 1897.

W. P. ANDERSON, Esq., C.E.,
Chief Engineer,
Department of Marine and Fisheries.

SIR,—I have the honour to submit the following report on the progress of the Survey of Tides and Currents in Canadian waters. During the year, substantial progress has been made in both branches of this survey. The principal tidal stations have been maintained; and they have also been utilized for the determination of tidal differences in an important region in the Gulf of St. Lawrence. A series of tidal differences for the St. Lawrence River has been worked out, and supplied with the tide tables for publication in the leading almanacs for 1897. In the other branch of the survey, an examination of the currents has been made in the north-eastern half of the Gulf of St. Lawrence from Anticosti to the Strait of Belle Isle; and for this work the SS. "Lansdowne" was again placed at my disposal for three months during last season. It may be best to describe first the progress made in the "Tidal branch" of the work; and then give the results obtained in the "Survey of the currents" this season, and also some account of the general movements of the water in the Gulf, with relation to the Gulf entrances.

THE PRINCIPAL TIDAL STATIONS.

In establishing these stations originally, a careful selection was made of the most commanding points on the Atlantic coast, at the Gulf entrances, and on the St. Lawrence. The stations, therefore are not only of direct value to our principal harbours, but they also serve as reference stations from which to determine tidal data in the regions lying between them. There are now seven stations in operation, situated at St. John, N.B., Halifax, St. Paul Island in Cabot Strait, Forteau Bay in the Strait of Belle Isle, South-west Point of Anticosti, Father Point and Quebec. The tide-gauges at these stations are so designed that they can be heated in winter to secure a continuous record of the tide throughout the year. They are provided with self-recording tidal instruments, and other necessary appliances; and the more isolated stations are also furnished with dipteroscopes, where there is no means of obtaining the time except by telegraph from some distant observatory, which during the first two years entailed considerable expense. These stations have been in continuous operation during the past year, without any interruption of consequence, and the tidal record obtained will serve to improve the accuracy of the tide tables, as soon as the expense for the necessary calculations can be met.

The recording instrument at the station in the Strait of Belle Isle was replaced by another in September; as its driving clock required cleaning. Also at St. Paul Island, the hair-spring of the clock of the instrument broke; and with the type of tide-gauge now in use, any such accident involves the entire removal of the recording instrument, and interruption to the record. In this instance, it was imperative to avoid interruption, as the gauge was being used at the time for comparison with simultaneous observations at Pictou and Charlottetown. St. Paul Island can only be reached fortnightly, and then a landing can only be made in fine weather; it

was fortunately possible to replace the instrument temporarily within three days, while it was sent away for repairs.

After extensive inquiry and careful consideration of the requirements, a form of recording instrument has been devised by myself, which obviates the uncertainty and expense connected with the use of the ordinary type of instrument. The essential point is to have a driving clock which can be readily detached from the rest of the instrument. This is secured by placing the driving clock inside of the revolving cylinder which carries the sheet of paper on which the tidal record is marked; as is done in some types of self-registering instruments of smaller size, used for meteorological purposes. In case of failure of the clock, a duplicate cylinder with clock inside can be substituted in less than two minutes, as it is released by a single screw. The defective clock can then be sent away for repair without interruption to the record. This new form of instrument is also provided with interchangeable gearing by which any one of four scales can be used; corresponding to a range in the tide of 9 feet, 18 feet, 27 feet or 36 feet. Our tides have such a variety in their range, that when an instrument requires to be changed to a new position, it has usually been first necessary to return it to the makers in Britain to have the gearing altered to another scale. There are also several minor improvements, especially in so arranging the carriage of the marking pencil, that the point of the pencil is readily accessible. This is important in making the comparisons on which the datum depends to which the observations have ultimately to be reduced. A recording instrument of this new type, manufactured by Messrs. A. Lége & Co., Covent Garden, London, has been in use at Pictou during last summer with very satisfactory results. This type of instrument should be substituted as soon as possible for those now in use at the more isolated stations, because of its reliable character. Its cost, including the duplicate clock, is also considerably less than the Lord Kelvin instrument, as there are no patent rights upon it.

TIDE TABLES; THEIR PREPARATION AND IMPROVEMENT.

The improvement which can be made in the tide tables each year has to depend upon the balance remaining after the charges of first importance are met. Out of the small vote available for this survey, the special appliances for deep-sea anchorage, and all current meters and other marine instruments required for the survey of the currents have to be provided; as well as the salaries of assistants and of the tidal observers, and maintenance and supplies for the tidal stations. The question of expense made it necessary to choose between these and improvement of the tide tables. The tide tables for Halifax were based upon old records obtained at the Dock Yard in 1860 and 1861; and it was found that an additional record also existed for the years 1851 and 1852. The reduction of this record to extend the basis of the Halifax tables had already been postponed. Sufficient record had also been obtained from the tide gauge at St. John, N.B., to enable tide tables to be prepared which are much needed; as such tables as are now published are based upon a fixed difference from ports on the other side of the Atlantic and are far from accurate; and they give only the time of high water without reference to the height of the tide, which at St. John is of special importance. The tide tables for Quebec were based upon observations for one complete year only, and there is now record sufficient to improve their accuracy. On considering these various claims in view of the money available, it was thought best to give the preference to the preparation of tide tables for St. John and the improvement of the Halifax tables; and to postpone the improvement of the Quebec tables.

The tide tables for Quebec for 1897 are still based therefore upon observations during one complete year obtained from the tide gauge at the dry dock at Lévis, namely, from 7th November, 1893, to 15th January, 1895. These tables are nevertheless far in advance of anything heretofore published. The basis on which the Halifax tables rest has been extended to include the four years for which the record existed; namely, 1851, 1852, 1860 and 1861. The datum to which the tides are at present referred is the one used in the old observations themselves which were

taken at the Dock Yard; but exact levels were taken in Halifax last autumn to connect the former datum with the new observations now in progress, and also with the dry dock, and when these are worked out a more definite result will be arrived at.

At St. John much difficulty has been met with, because of the want of a satisfactory datum for the reduction of the observations; as explained in a former report. It has been necessary therefore to redetermine the low water datum from the new observations themselves. This determination is being made with great care. Comparisons were made last June, with the co-operation of Mr. E. T. P. Shewen, C.E., of the Department of Public Works, to ascertain as nearly as is now possible the low water datum used in the survey of the harbour, on which the chart is based. The result when brought into relation with the present tidal observations, and the tables based upon them, will enhance the value of the chart of the harbour; and will also afford a reliable datum for future harbour works there. Tide tables for St. John are now in preparation for 1898; and they will be based upon two full years of observation in that harbour, namely, 30th April, 1894, to 18th May, 1896. They will give the height as well as the time of both high and low water.

In preparing these tide tables, the height of the tide at every hour throughout the year is taken from the record received from the tide station; and these heights are reduced to a datum as determined or selected by this survey. There are thus 8,760 actual observations of the tide obtained from any one station during the course of the year. The results thus condensed serve for the computation of future tides as given in the tide tables. This computation is made by Mr. E. Roberts, F.R.A.S., of the Nautical Almanac Office, London; by means of the latest methods of harmonic analysis and with the assistance of a tide-predicting machine, built for the government of India.

PUBLICATION OF THE TIDE TABLES.

Tide tables for Halifax and Quebec for 1896 were supplied without charge to the almanacs; and this was the first year that reliable tide tables for any Canadian ports were thus widely available. A "Notice to Mariners" drawing attention to them was issued by this department in January, 1896.

The tide tables for 1897 were again offered to all the leading British and Canadian almanacs willing to publish them; and the harmonic constants derived from the observations were also supplied to the United States Coast and Geodetic Survey, as a basis for their tables for Halifax. The tide tables for both Halifax and Quebec appear in the *Canadian Almanac*, published by the Copp, Clark Co. of Toronto; and in *Greenwood's Almanac*, published by Mr. W. N. Greenwood of Lancaster, England. The *Star Almanac* which published them last year, has not been issued for 1897. A summary of the tables for Halifax, also appears in *Belcher's Almanac*, published by the McAlpine Co.; and in *Cogswell's Almanac*, published by Mr. R. H. Cogswell of Halifax. The tide tables for Quebec are also given in a publication prepared by the Montreal Harbour Commissioners for the use of the pilot service. In all the above, due acknowledgment is made to the Tidal Survey branch of this department for the tables supplied. Three British almanacs, *Brown's*, *Jefferson's* and *Holden's*, have not yet arranged to publish them; and *McMillan's Almanac* of St. John, N.B., is only willing to publish tables for St. John itself, which will not be ready till next year. In order, therefore, to make the tide tables for this year more widely known, an arrangement was made with the Copp, Clark Co., to reprint them from the *Canadian Almanac* as an 8-page pamphlet; and copies have been sent to the agencies of this department, to collectors of customs, the secretaries of corporations of pilots and boards of trade, harbour commissioners, and the leading steamship companies; and also to thirty-six vendors of almanacs and marine publications in Great Britain, Europe, the United States and Canada.

TIDAL DIFFERENCES.

With the tide tables for Halifax and Quebec, tidal differences are given, by which the time of the tide can be found for other places along the St. Lawrence, and

on the Atlantic coast of Nova Scotia. The tidal differences for the St. Lawrence have been extended, and now include the whole of the tidal portion of the river, from Three Rivers to Gaspé, a distance of 420 nautical miles.

The differences for the Lower St. Lawrence are based upon a comparison of the observations from the tide stations at Father Point and Anticosti, with the simultaneous observations at Quebec, throughout one year. The observations used for the purpose extend in all from 12th November, 1894, to 13th January, 1896. This comparison shows that the differences are very constant throughout the course of the lunar month; so that the tide at Father Point and Anticosti can thus be correctly deduced from Quebec. It was, therefore, justifiable to base tidal differences for intermediate places upon the differences between their establishments as given in the Admiralty list; and these will serve in the meantime until direct observations can be obtained throughout this region. This uniform progress of the tidal undulation up the estuary of the St. Lawrence from Anticosti to Quebec is in marked contrast to the great irregularity which is found elsewhere in the Gulf of St. Lawrence. It is, therefore, quite unsafe to assume that the difference in the time of the tide between one point and another is constant; unless it can be proved to be so by direct observation.

The differences between Quebec and places above, as far as Three Rivers where the tide ceases to be felt, are based upon two series of observations taken by Mr. R. Steckel, C.E., of the Department of Public Works, in October, 1887, and May, 1888. These observations were taken simultaneously at seven points along the river; and each series occupied one complete month, at the seasons of lowest and highest level of the water in the St. Lawrence river itself. These observations show that on the whole the tidal undulation travels more slowly up the river when the water is at its highest; it being then from eight to twelve minutes later on the average than when the level is lowest. The reason of this appears to be that the current in the river is stronger in the high level season, and thus keeps the tide back. The differences published are the mean values for the two seasons, and these should be practically exact. On the other hand, the high tide makes its way up the river much faster than the low tide, the difference in speed making the time of low water more than an hour late relatively to high water, as far up as Grondines and Champlain. It is, therefore, necessary in the tables, to state separately the tidal differences for high water and low water respectively, for places above Quebec. A comparison was also made between these observations, and the time of the tide as noted throughout the season of 1895, by the semaphore operator at Lotbinière.

The tide tables themselves are in Standard time for the 60th and 75th meridians respectively: and the tidal differences for the other places are computed to give the time of high and low water in Standard time also. In this way the master of a vessel can know the time of the tide directly from his chronometer, by allowing an even number of hours from Greenwich time, without the trouble of looking up his longitude. Standard time is also the most convenient for harbour purposes as it is now used all but universally on shore.

SPECIAL OBSERVATIONS FOR TIDAL DIFFERENCES.

In the Gulf of St. Lawrence there are regions in which the tides show great irregularity, and where constant differences with ports on the Atlantic will not apply. This will be better understood from the following comparison, which shows the great irregularity in the difference in the time of the tide across the open Gulf, as contrasted with the even progress of the tidal undulation up the Lower St. Lawrence, when once it has entered the mouth of the river between Gaspé and Anticosti:—

Difference in the time of high water between St. Paul Island in Cabot Strait, where the tide enters the Gulf, and South-west Point of Anticosti at the entrance to the St. Lawrence. Distance, 190 nautical miles. From simultaneous observations in six months during the years 1893 and 1894. Difference in absolute time ranges from 4 h. 30 m. to 6 h. 50 m.

Difference in the time of high water between South-west Point of Anticosti and Quebec, omitting irregularities due to wind. Distance, 360 nautical miles. From simultaneous observations during eleven months in 1894 and 1895. Difference in absolute time ranges from 5 h. 13 m. to 5 h. 39 m. Mean = 5 h. 26 m.

The wide range in the difference of time across the open Gulf, is chiefly due to an unusually great diurnal inequality in Cabot Strait itself; that is, a long interval and a short interval of time between the tides of the same day. It is remarkable, when this inequality is so great in the main entrance to the Gulf by which the tide comes in from the Atlantic, that it should so disappear that scarcely a trace of it is to be found in the tides of the Lower St. Lawrence or at Quebec. On the other hand, this inequality is very marked in Northumberland Strait and the neighbouring regions. It is probable that this is due to tidal interference, occasioned by some contrary tidal undulation which over-runs the main tide entering through Cabot Strait.

The practical results of this inequality are very evident, however. On account of the importance of St. Paul Island in the main entrance to the Gulf, many endeavours have been made to establish a constant difference between it and some port on the Atlantic coast of America or in Europe; but the inequality is there so great that these endeavours have been without result. This diurnal inequality is also very marked at Pictou and Charlottetown in the region referred to.

The diurnal inequality varies with the declination of the moon north or south of the equator; and not with the moon's phases as in the case of the ordinary change from spring tides to neaps. This change still goes on, while the other variation is superadded; and as it takes place in a different period, it is continually overrunning the former. The resulting irregularities are, therefore, very great, unless these two causes are carefully distinguished from each other.

These conditions made it necessary to obtain direct tidal comparisons between the important harbours of this region and the tides as they enter Cabot Strait. For this purpose, the tide-gauge at St. Paul Island was essential, and as it has been twice destroyed by winter storms in three years, on account of its exposed situation, it was necessary to obtain the required observations without delay. A tide-gauge had also been erected at Halifax in the previous season, and the gauge at Anticosti had been put in good order; and as any of these might prove necessary for purposes of comparison, it was advisable to obtain the new observations while they continued in good working order. It was also important to determine how far south of Gaspé in the Bay des Chaleurs and along the New Brunswick coast, the tides could be referred by constant differences to Anticosti and Quebec; and where the irregularities due to diurnal inequality first manifested themselves.

Arrangements were therefore made to take special observations in the region extending from Gaspé along the south-western side of the Gulf, through Northumberland Strait, and around Prince Edward Island. As this comprises some 580 miles of coast-line, it was necessary to select places which were reasonably accessible, to avoid undue delay in travel. The principal harbours in the region had the first claim; and consideration had also to be given to the relative importance of places from a tidal point of view, so as best to obtain tidal differences for intermediate points. The choice of the following places as temporary tidal stations was accordingly made: Carleton, as near the head of the Bay des Chaleurs as possible, while avoiding the local influence of the Restigouche River; Lower Neguac, near the mouth of Miramichi Bay, to obtain the open tide unaffected by the bars and rivers of the bay; Charlottetown, where the tide in Northumberland Strait has the greatest range; Pictou, in line with the open channel between Prince Edward Island and Cape Breton Island, up which the tides pass; and Souris, the nearest port to Cabot Strait which is readily accessible, as there is no railway communication on the west side of Cape Breton Island.

The erection of temporary tide-gauges at these places and the superintendence of the observations was entrusted to Mr. H. M. Mackay, who carried out the work very efficiently. By the use of self-registering instruments, more than twice as much information was obtained as could have been got by direct or personal observation with four to five times the expense.

At Pictou, the recording instrument of new design, already referred to, was used. At the other stations the instruments were of a smaller type than those at the principal tidal stations; they were of the Richard pattern, supplied by Casella of London, and were made with a scale specially adapted to this region. They are strong and simple in construction, so that the manipulation presented little difficulty to inexperienced observers. The complete tide-gauge was as follows:—firstly, a vertical plank box, to serve as a tide well, which could be strapped to the side of a wharf; holes were bored in the lower end sufficient to admit the water freely, but not to allow of inconvenience from wave motion. A shelter box containing the registering instrument, was placed directly on top of the tide well. As these tide-gauges were in operation during the summer months only, they did not require to be built in the same substantial manner as when they have to withstand the severity of the winter and to be provided with heating. They could thus be set up at small expense wherever a wharf or pier was found running out beyond the low-water line.

The readings of the instrument as regards elevation were checked by comparison with a graduated staff set up beside it; and the elevation of the zero of the staff was referred to a bench mark on shore. At most of the stations, time could be obtained from railway telegraph offices; but where there were no such facilities a meridian mark was placed, and the observer was supplied with a table giving the "Sun on meridian" in 60th standard time.

The results obtained at these five stations were supplemented by observations at places which stood next in importance, in obtaining correct tidal differences. On the coast between Miramichi Bay and Pictou, short series of staff readings were taken at Richibucto, Buctouche and Pointe du Chêne; and a gauge record during two months in all, was obtained at Cape Tormentine, where the strait is narrowest. Also, on the north coast of Prince Edward Island, a short gauge record was obtained at St. Peter's Bay and at Alberton, and staff readings at Rustico.

The total amount of tidal information obtained is shown in the following list. Throughout the progress of this work, a simultaneous record of the tide was obtained at the principal stations at Halifax, St. Paul Island and Anticosti. Also, where the observations were obtained by self-registering instruments, they were continuous day and night during the time indicated. The only interruption of consequence occurred at Charlottetown, where the partial chokage of the inlet made the observations unreliable for a time.

Carleton.....	June	29th	till	Nov. 9th.	Gauge record.
Neguac.....	July	20th	do	Nov. 6th.	do
Richibucto.....	Aug.	5th	do	Aug. 8th.	Staff readings.
Buctouche.....	Sept.	15th	.....	.....	do
Pointe du Chêne....	Sept.	8th	till	Sept. 11th.	do
Cape Tormentine.....	July	25th	do	Aug. 10th.	Gauge record.
do	Aug.	31st	do	Oct. 10th.	do
Charlottetown.....	June	20th	do	June 29th.	do
do	July	18th	do	Nov. 25th.	do
Pictou	June	3rd	do	Nov. 27th.	do
Souris.....	June	11th	do	Nov. 24th.	do
St. Peters Bay.....	Oct.	27th	do	Nov. 24th.	do
Rustico.....	Oct.	20th	do	Oct. 24th.	Staff readings.
Alberton.....	Oct.	13th	do	Oct. 23rd.	Gauge record.

Such tide tables as are now published in local almanacs for ports in this region, are based on constant differences from Halifax or some other Atlantic port; and it is, therefore, evident that they must necessarily be far from correct. Their error is greatest when the moon's declination is at its maximum, north or south of the equator. The observations of this season show that the time of high water as given in the local almanacs now published, is in error by the following amounts:—At Pictou 1 h. 25 m. early or late; at Charlottetown, 1 h. 12 m. early or late. These errors correspond approximately with the half-range of diurnal inequality, which at Pictou amounts to 1 h. 15 m.; and at Charlottetown also it is nearly as great.

It has been possible to obtain from the present observations a variable difference with Halifax in terms of the moon's declination, which has enabled tide tables to be prepared for Charlottetown and Pictou in time for the season of navigation of 1897. Tables prepared in this way will be sufficiently accurate to be practically serviceable; and they will answer in the meantime until better data can be obtained from a more thorough analysis of the present records, or from a longer series of observations. The observations obtained at the other places will be used to extend the tidal differences supplied with the tide tables for next year.

The tidal differences which have been published with the tide tables up to the present time are limited to regions in which their accuracy can be depended upon, as proved by direct observation; as otherwise serious errors might be made. It is therefore, very important to extend these differences each season as far as possible; and this can now be done at a relatively small expense, while the principal tidal stations are available for comparison. Observations are now much required around Cape Breton where there are several important coaling ports; also on the southwestern coast of Nova Scotia, and throughout the Bay of Fundy; as well as along the Lower St. Lawrence at intermediate points between Quebec, Father Point and Anticosti.

The determination of tidal data for the north shore of the Gulf, from Point de Monts past the Mingan Islands and Cape Whittle to the Strait of Belle Isle, has not yet been attempted by this survey; but this is a region which is relatively of less importance.

OTHER INFORMATION AND RECORDS OBTAINED.

With a view to future work in the Bay of Fundy, copies were made last season by permission of the late H. G. C. Ketchum, C.E., of the tidal information obtained by the Chignecto Marine Railway Co. The accurate levels carried from Chignecto Basin to Bay Verte, serve to connect the mean sea level in the Gulf and in the Bay of Fundy, and the levels of high and low water on both sides of the isthmus have been obtained with reference to the marine railway datum.

The level reached by the exceptionally high tide of October 8th, 1896, was also obtained at Chignecto and Moncton, with reference to railway datum planes; and in relation to the Saxby tide of 1869. This high tide in October overflowed the dykes of the hay lands in the neighbourhood of Amherst and along the Petitecodiac River, and did much damage. If a tide of this height proves to be due to astronomical causes alone, as appears probable, its recurrence under similar conditions will be subject to prediction in future, as the level reached has now been ascertained; and warning may thus be given.

It would be of great value if warning could be given for exceptionally high tides at Quebec and St. John, which occur during storms and often do much damage. It is not impossible that the effect of meteorological conditions upon the tide may eventually be arrived at, from a careful comparison of wind and barometer with the exceptional tides recorded by the tide gauges. The necessary data for the purpose are being collected as time goes on.

A request has been received from the pilot service to prepare a tide table for the pilot station at Father Point. To save expense in printing, this has been made out in manuscript only, in time for the opening of navigation.

Copies of the tidal record for two leading points in British Columbia have been received regularly since January, 1895. These are from self-registering gauges erected by the Department of Public Works at Victoria, and at Sand Heads at the mouth of the Fraser River, in the Gulf of Georgia. Observations are also received from New Westminster, and from a point intermediate between it and the mouth of the Fraser River. These records will soon be sufficient for the preparation of tide tables for these points, when office time can be given to it, and the expense of the computations can be met.

Some tidal data for the St. John River were kindly supplied by Professor A. W. Duff, of Purdue University, LaFayette, Indiana, in exchange for information regard-

ing secondary tidal undulations at St. John, N.B., which he is investigating. Professor Duff obtained these data last season while at his country residence on the St. John River.

Tidal information from the gauges at Quebec, Father Point and Halifax has been supplied to Mr. R. Steckel, to facilitate the work of geodetic levelling which he is carrying out for the Department of Public Works; and copies of the tide curves from those stations have been of value to him in the determination of mean sea level.

SURVEY OF THE CURRENTS.

The region examined this season was the north-eastern portion of the Gulf of St. Lawrence, from the eastern end of Anticosti to the Strait of Belle Isle. It forms an arm which lies between Newfoundland on the south-east, and Saguenay County in the province of Quebec on the north. This north shore is often termed "Labrador," which is both incorrect and misleading; as no part of the Gulf is bordered by Labrador, and it is also a territory belonging to Newfoundland and not to Canada. The length of this arm of the Gulf is 220 miles, and in area it is nearly equal to the English channel. It is traversed by all the steamship lines which use the St. Lawrence route; which makes the investigation of its currents of the first importance.

The region under consideration has a width of 100 miles between Cape St. George (Newfoundland) and East Cape (Anticosti) and runs in a north-eastward direction to the Strait of Belle Isle, where its width narrows down to 10 miles. From this main arm of the Gulf, a side channel runs off to the north-westward, between Anticosti and the north shore. This channel has a width of 60 miles between the east end of Anticosti and Natashquan Point, and narrows down to 16 miles at the Mingan Islands, in a length of 115 miles. Around the greater part of the shores which bound these areas, the water increases gradually in depth to 60 or 80 fathoms at about 20 miles from the shore; and along the middle of the main arm and the channel north of Anticosti, there is a deep channel of 100 to 150 fathoms in depth. This deep channel continues through Cabot Strait with increasing depth to the Atlantic. (See outline chart, Plate 1).

For the investigation of the currents in this region the SS. "Lansdowne," of the lighthouse and buoy service, was placed at my disposal for three months—July, August and September, 1896. From this time considerable deduction has to be made for interruption to the work in obtaining supplies, and for rough weather; and also a necessary visit to the tide-gauge in the Strait of Belle Isle. The nearest port for coal and supplies was North Sydney, C.B., but there were places along the shore where water could be obtained from the natural streams. When shelter was required it was usually necessary to make a long run to obtain it. The investigation of the currents was carried on by myself, with the assistance of Mr. G. G. Hare, who also took continuous meteorological observations. The commander of the vessel, Captain G. W. J. Bissett, and the first officer, Mr. J. B. Sutherland, gave valuable co-operation in furthering the work; and also the second and third officers, N. McKellar and A. Lane, in noting the direction of the current during the night.

As the steamship route traverses the region in question on a direct line from Heath Point, Anticosti, to the Strait of Belle Isle, it was decided to give most attention to the study of the currents met with along this route itself. It was important to ascertain whether any general set existed either with or against vessels on this route: and also whether there was any cross-set making out or in through the channel north of Anticosti. A set of either character, if found to exist, might put a vessel seriously out of position in rounding Anticosti or making the Strait of Belle Isle. Little was known with respect to what currents were likely to be met with in this region, beyond what had been already ascertained by this survey. It was thus known that the current in the Strait of Belle Isle itself was tidal in its character, with a flow nearly equal in each direction, and that the difference of flow inwards towards the Gulf was very slight; and consequently it was not to be expected that a constant current of any considerable strength would be found

to run through this region towards Cabot Strait. It had also been ascertained that the current at the other extreme angle of this region, namely, in the Mingan channel, was likewise tidal in its character, with a flow which was practically equal in the two directions. (See report of progress on this survey, 13th April, 1896; page 17.) On the Admiralty charts two currents were indicated locally, in the channel north of Anticosti; one setting to the south-east round Natashquan Point; and the other near the eastern end of Anticosti from Table Head to East Cape, setting to the southward. Such currents, if they proved to be constant in their character, might furnish a valuable indication; as they might be the shore edges of a general outward set in that channel; or on the other hand they might imply a return flow inwards up the middle of the channel. A set in either of these directions would be directly across the steamship route from the offing of Cape Whittle to Heath Point. It was, therefore, important to obtain continuous observations at the points where these currents were shown; to ascertain whether they were really constant, and for comparison with the currents as found in the open channel. For this purpose two pairs of flag-buoys were made and provided with suitable moorings; the larger buoy carried a white flag and was fastened directly to the moorings; and the other was attached to it by a line 200 feet in length and carried a red flag. As these buoys swung round on their moorings, the direction of the current could be readily observed from shore at a distance of two or three miles. Arrangements were made with two men to take these observations, and they were brought from North Sydney on the steamer. One of them was landed at East Cape, and provided with a tent and camp outfit. A pair of buoys was placed off the cape, where they were also in view of the lighthouse at Heath Point. As this observer left his post after a short time, the observations were continued from the lighthouse itself, until the buoys went adrift during a gale. The other observer was landed at Natashquan Point, and took up his quarters in a shed, the only building remaining at the abandoned Hudson Bay post. He was also provided with a boat, which could be anchored out to ascertain the direction of the current. This was very useful, especially during fog when the flags could not be seen. The time of change in the current was taken on a watch, which was regulated during the season by a table giving time of sunset. The positions of the two pairs of buoys are shown on the chart, Plate I. The results obtained will be referred to when the nature of the currents in the various localities is described.

In addition to the direct observations above referred to, information was requested from the leading steamship companies traversing this region, in reply to circulars prepared for the purpose and supplied to their captains, on which the character of the current met with on each voyage could be entered. Much useful information, especially as to the character of the currents at other seasons of the year, was obtained from fishermen and others acquainted with these waters.

GENERAL METHODS EMPLOYED.

The general method used to ascertain the nature of the currents, was to anchor the steamer at various points or stations carefully chosen. The steamer itself was thus a fixed point from which to determine the direction and velocity of the currents. As these currents are all influenced by wind and tide, it is important to have good meteorological and tidal data for comparison with the observations obtained at the various stations themselves. The only permanent meteorological stations at which continuous observations of wind and barometer could be obtained for comparison, are at the extreme ends of the region in question; namely at South-west Point, Anticosti, and on the island of Belle Isle; distant 360 miles from each other. The local wind record obtained on board, was not always satisfactory; as sometimes during the heaviest winds, the steamer lay close to the coast, or was anchored in some bay for shelter. The tidal data required are better given: as two of the principal tidal stations established by this Survey, are at South-west Point, Anticosti, and at Forteau Bay in the Strait of Belle Isle. These tide stations are within about 100

miles of the localities where tidal influence in the current was most distinctly detected.

In addition to the regular observations of the currents, the density of the water and its temperature were taken at regular intervals along all the courses which there was occasion to run. In this way an extensive series of densities and temperatures were obtained; and some of the same lines were run twice at different dates for comparison. This method has often been found useful in tracing the direction of the movement of the water. Also, at anchorage stations where the current was found to veer widely in its direction, the temperature of the water was taken every half hour in the hope of finding some difference to accord with the varying direction of the current itself.

The depth at which it was necessary to anchor at the various stations, ranged from 30 to 150 fathoms; and the holding ground was often very poor; as the bottom was sometimes flat rock lying horizontally, or soft mud. This mud was usually met with at the greater depths. The steamer itself is too heavy for the purpose, and difficult to hold. Its sides are so high, especially towards the bow, that the wind pressure alone is often enough to make it drag anchor on such bottom; especially when the current holds it broadside to the wind. In many cases the rough weather only lasted a few hours, as the sea falls very quickly in the Gulf; and if the vessel could have been held while it lasted, much time would have been saved. On one occasion in endeavouring to do so, the mooring hawser of steel wire one inch in diameter was parted, and the best anchor for holding was lost. The available shelter was so far distant, it was usually more advantageous to "lie to" in the open and keep in the vicinity of the station, even if the heavy weather lasted a day or two. The anchorage appliances used, which are of a special character, have been described in previous reports. They were improved and re-inforced as much as possible for this season's work.

METHOD OF OBSERVING THE CURRENTS.

It soon became evident that the methods employed in previous seasons would require much modification, owing to the difference in the character of the currents. The currents examined in former seasons had considerable strength, from one to three knots, and generally a uniform direction for at least some hours at a time. Their chief variation was in velocity, which fluctuated with the tide, or fell off with the depth. But the currents in the region examined this season varied chiefly in their direction. They usually veered in direction from hour to hour, often going completely round the compass, and the direction at any depth was often different from the surface direction. Their speed was always low, seldom exceeding one knot per hour. Hence the direction of the current, both at the surface and below, was of much more importance relatively, than the accurate determination of velocity. At the first station occupied, where the depth was 155 fathoms, a number of careful measurements of the velocity were made, with a current meter, as far down as 80 fathoms. The velocity was found to vary very irregularly at different depths, and as the meter did not indicate direction, these observations proved of little value. To understand these currents, it was found quite as necessary to examine the under-current as the surface current itself, as will be more fully explained when the influences that affect them are discussed. The methods adopted to arrive at their nature were, therefore, as follows:—

The direction of the current on the surface was obtained by a float attached by a line to the stern. This float was made of a board painted white, with short pieces standing out vertically from its under side to give it a good hold in the water; and weighted with lead to bring it even with the water and prevent the wind from having any hold upon it. The direction of the current was read by taking its bearing on a dumb compass at the stern; which was set to the heading of the ship at each observation. The direction of the surface current was thus obtained every half hour, continuously, day and night. The velocity of the current was measured by a current meter, registering electrically by means of a counter on board. This meter

was placed at a depth of 18 feet (three fathoms) which is the standard depth adopted in this survey from the beginning; as it is necessary for accuracy to measure the velocity below the level of the keel of the steamer, which has a draught of 13 feet 6 inches. The direction of the current at 18 feet was readily observed during the day time, by noting the position of the meter in the water. This direction often differed as much as two points from the direction at the surface. The direction in which the current would set a vessel of ordinary draught was, therefore, better given by taking the average between the direction on the surface, and the direction at 18 feet. This average is given in the results shown in the plates, whenever the double observations were obtained, as there noted. The velocity of the current was noted from the counter attached to the meter, every half hour during the day time; but the importance of the velocity measurements did not warrant the continuance of these observations during the night; and the direction at 18 feet could not then be seen. The meter was, therefore, kept at work for 12 hours a day only.

The under-currents were examined by means of a "deep fan," consisting of two sheets of galvanized iron passing through each other at right angles, and thus forming four equal wings; and suspended in the water by patent sounding wire. This appliance was used with a Thomson sounding machine, on which the depth at any moment could be read off very conveniently. The fan was 26 inches deep, and each wing was 9 inches wide; and its area, which was practically the same in any position in the water, was 3.25 square feet. The fan itself weighed 14½ pounds, and in these slow currents it was used without the addition of any further weight or sinker. The sounding wire by which it was supported consisted of three strands of fine wire braided over; its thickness over all being a little less than one-tenth of an inch. This simple appliance was found to afford a very delicate means of determining both the direction and strength of the under-current at any depth, where the currents themselves were so low in their velocity. The fan would swing out from the vertical in the direction of the current, and the supporting wire was so fine that the current nearer the surface had practically no hold upon it. In this way the direction could usually be found to the nearest point. The velocity could also be ascertained very closely by reading the inclination of the supporting wire to the nearest degree with a clinometer. The velocity corresponding to each inclination was determined by direct experiments, from which a table was made to reduce the observations. To obtain the correct depth, the fan was lowered to the surface of the water and the dial of the sounding machine set at zero. The reading on the dial then gave the depth below the surface correctly if the inclination of the wire did not exceed 15° from the vertical. When the angle was higher than this, additional wire was let out to allow the fan to reach the true depth. The amount required was found in a moment by means of a table of cosines of angles. This was carefully attended to in making the experimental observations for the velocity corresponding to the inclination.

For this purpose the calmest days were chosen, and the fan was lowered to 18 feet, the same depth as the meter. The meter register for the velocity and the inclination of the wire of the fan were taken at exact intervals of five minutes. In this way 43 determinations were obtained of the velocities corresponding to the various inclinations from 10° to 30°. These were first classified according to the inclinations, and the average velocity for each inclination was obtained. The velocities so found were then plotted graphically, and a mean curve drawn through the points. This curve was a parabola, for which the best form of equation is as follows:

$$v^2 = 1.067 \tan i,$$

in which v is the velocity in knots per hour, and i the inclination of the wire from the vertical. The form of the curve shows also that for inclinations beyond 30°, which sometimes occurred, proportional values may be correctly used. A few values may be given as samples, from the tables thus obtained which will serve to show that the velocities of the under-current, which are given in tabular form with this report, are quite reliable to the tenth of a knot, which is as closely as they are

PLATE I.

TIDAL SURVEY

NORTH-EAST GULF OF S

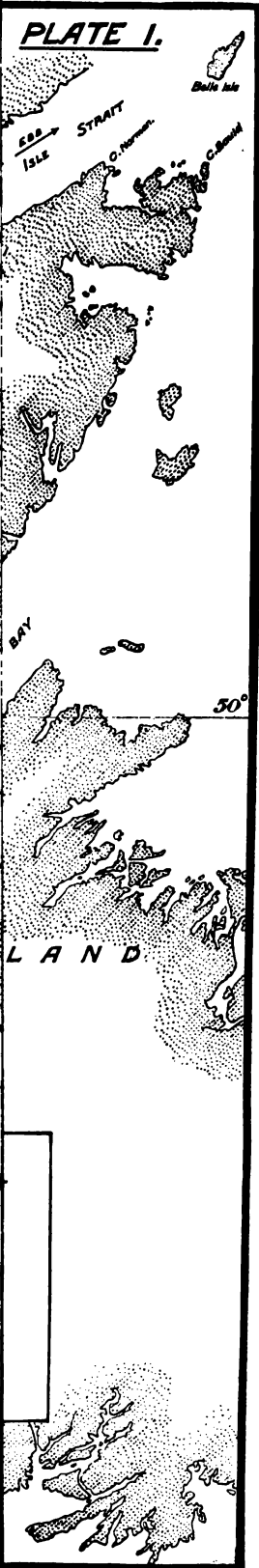
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TIDAL SURVEY. SEALATE II.

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26 Aug.					↖	↗	↖	↗
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9 Sept.	0	↖	↖	↖	↖	↖	↖	↖
10 Sept.	↖	↖	↖	↖	↖	↖	↖	↖
11 Sept.	↖	↖	↖	↖	↖	↖	↖	↖

given. With so light a fan, flaws in the current itself were often noticeable, which gave different inclinations, especially near the surface. When this was the case a mean value was obtained, in taking the observations.

Inclination i , in degrees.	4°	6°	8°	10°	15°	20°	25°	30°
Velocity v , in knots per hour.....	0·27	0·33	0·38	0·43	0·53	0·62	0·71	0·79

In using the deep fan for the observation of the under-currents, it was generally best to lower it first to the greatest depth, where the inclination was usually nearest the vertical; and in raising it the inclination would increase towards the surface, as the current became stronger. In this way a set of observations from a depth of 30 or 40 fathoms to the surface could be obtained quickly, which was often important when the current was veering and changing.

It would have been very helpful in understanding the currents in this region, if the direction of the under-current could have been obtained at regular intervals at some standard depth, say every half hour at 30 fathoms. This was attempted, but found to be impracticable owing to the swinging of the vessel on its hawser. This swinging was the chief difficulty; and to obtain reliable results much patient watchfulness was required, to take advantage of times when the vessel was most steady. The swinging was partly due to the slowness of the currents themselves, as the vessel lay "between wind and current," and every flaw of wind drove it against the current or allowed it to swing back. When the current was strongest, it would lie the most steadily even in a stiff breeze. The trouble was largely owing to the unsuitable character of the vessel itself. With a length of 180 feet, it has an area above water on a longitudinal section of 2,980 square feet. Its high sides, especially towards the bow, give the wind a great hold upon it; and this appears to explain the worst kind of swinging that occurred, when the vessel would head first to one side and then to the other, after the manner of a kite in the air. Under certain conditions this would continue for two or three hours at a time, until a change occurred in either wind or current. The change of heading amounted to two or even four points, in a corresponding period of ten to twenty minutes; and the extent of the swing was therefore great, as the depth of anchorage usually ranged from 40 to 80 fathoms, and the length of hawser was twice to three times the depth, which gave a long radius for swing. The trouble was sometimes mitigated by hoisting a try-sail aft. But while any serious amount of swinging went on, the under-current observations by the method described were not attempted, as then also the closest attention was required to find the correct direction of the surface current itself. To obviate any uncertainty in the under-current observations, a reflector was attached to the binnacle compass which enabled it to be watched constantly while standing by the deep fan, and in this way any swinging of the vessel could at once be detected.

All directions and bearings given throughout this report, are magnetic. The variation in this region ranges from 29° to 34° west.

The methods used for accuracy in the determination of densities, and temperatures, were the same as those already described in last year's report. (See report of progress, April, 1896; pages 9 and 10.)

SELECTION OF STATIONS.

The stations for the observation of the currents were chosen to ascertain the actual nature of the currents met with on the main steamship route already referred to; and also whether there were any currents of a constant character, or any general circulation in the north-eastern portion of the Gulf of St. Lawrence. As the first

question requiring examination, was whether there was any cross-current on the route from Cape Whittle to Heath Point, the first station occupied in the early part of July, was station A between these points, and at the middle of the channel lying between Anticosti and the north shore. (See chart, Plate I). This station is at an equal distance from the nearest shores on the two sides of that channel; being 35 miles off Table Head, Anticosti; and also 35 miles off Kegashka Bay on the north shore. It is also a little within the line joining Cape Whittle and Heath Point; and is, therefore, well placed to ascertain whether there is any indraught or outflow of current along the line of this channel. The depth of water is 155 fathoms. The weather was exceptionally quiet and favourable; and as spring tides occurred while there, any tidal influence in the current should be at its maximum.

Station B is 24 miles S.E. of Heath Point, and lies on the centre line or axis of the island of Anticosti; and it is also at the intersection of lines lying tangent to the 30 fathom banks, off the south-west and north-east sides of the island at its eastern end. It is thus well situated to obtain the direction of currents which may be guided by the trend of either shore of the island, or the edges of the outlying banks. The depth of water is 52 fathoms.

It was desirable to occupy this station again in September; but as the weather was then more broken, a position was chosen at station H, nearer to Heath Point. In this way it could be more quickly reached whenever the weather was sufficiently moderate to hold at anchor. During nine days anchorage was made four times at this station; and two of these days were too rough to make the attempt. Although the position made was closely the same each time, the depth ranged from 35 to 42 fathoms. This was still sufficient for good under-current observations.

Station C is 18 miles off Cape Whittle, where the main bend in the north shore occurs. It affords a good position to ascertain any relation between currents that may follow the trend of the shore in either direction; and also to detect any tidal element which may influence the currents.

Stations D and E are situated further to the eastward along the north shore. They are 13 to 15 miles from the coast, which makes their situation similar to station C, with reference to any current which may follow the direction of the coast itself. Station E is so placed also, as to be away from the vicinity of the inlets on that part of the coast, and thus to avoid any local cross-currents of a tidal character. The depth at station D is 45 fathoms, and at E, 98 fathoms. These six stations all lie in the vicinity of the steamship route from Belle Isle to the St. Lawrence.

Stations F and G are similarly situated with respect to the coast of Newfoundland; and the same considerations influenced the choice of their positions. Station G is quite beyond the influence of any local current from Bonne Bay. The depth at these stations is 40 and 42 fathoms respectively. It was found better, owing to the irregular character of the currents themselves, to occupy these eight stations for a longer time, rather than to attempt observations at a greater number of points, in the time available for the work.

GENERAL CHARACTER OF THE CURRENTS.

In the region referred to, the currents in the summer months are all very moderate in their speed, usually ranging from about half a knot to one knot per hour. It is reported, however, that there are currents much stronger than this in the spring of the year; but this we will have occasion to refer to again. In their direction the currents are extremely variable and irregular, especially towards the surface; that is, in the layer of water between the surface and five or ten fathoms in depth. Below this, the under-current at 20 and 30 fathoms may sometimes show more definite characteristics; as for example a tendency to make constantly in some one direction, or to vary with the tide. The surface current often appears, therefore, to have little relation to the under-current in its direction or velocity, in the time at which it slacks, or the manner in which it veers.

The reason most probably is that the surface of the water is more directly affected and disturbed by the influence of the wind; while the under-current may continue to follow the law which dominates in any particular locality. A noteworthy example of this has already been described in the case of the current in the Strait of Belle Isle. (See annual report, Marine and Fisheries, for 1894; page 99.) The usual tidal character of the current in that strait is maintained by the under-current, at times when the surface current is gradually acquiring a constant set in one direction under the influence of heavy and continuous wind.

It is thus essential to give careful attention to the investigation of the under-current in order to understand the surface current itself; for if it is the movement of the under-current which is more in accordance with the normal conditions of the locality, it will come up to the surface as soon as the disturbing influences which have been acting on the surface of the water, cease to operate. The study of the under-current is therefore also necessary, if any hope is entertained of arriving at the general circulation in this portion of the Gulf, or the true relation of its currents to the causes which influence them.

The general causes which act upon both the surface and the under-current, and often affect them so differently are:—1. Tidal influence. 2. The influence of the wind and barometer. 3. A cause of a wider character which shows itself as a tendency in the current to set constantly in some one direction.

In describing the actual behaviour of the currents as ascertained from the observations taken, and from the information which was collected during the season, we will have occasion to refer to the effects of these influences upon the currents, so far as they can be traced. The observations will also show the limiting speed of the currents; their prevailing directions; and the range of direction in which they may possibly set; all of which is of direct practical value.

NATURE OF THE CURRENTS AS OBSERVED.

The positions of the stations at which the observations were made, are shown on the outline chart, Plate I. The actual directions of the surface current at the various stations are shown in Plates II. and III., in which the times of high water and low water from the tidal station at South-west Point, Anticosti, are also given for comparison. In Table I., a summary is given to show the time during which the current set in each direction at the various stations, and the time during which there was no current. This table is made from the observations of the current every half hour, by summing up the total number of half-hours during which the current set in each direction. It serves to show whether the current has any dominant direction; and also the directions through which it may veer and in which it is most prevalent. The same result is shown graphically on the chart, Plate I.; where the arrows radiating from each station in the eight leading directions, indicate the prevalence of the current in each of these directions. (The length of the arrow gives the time that the current ran in its direction, as a percentage of the total time that the station was occupied. Hence the total length of the arrows at each of the stations is the same, if the time during which there was no current, is allowed for; as this length makes up 100 per cent in each case.)

The observations of the under-current are given in Table II. The direction and velocity at the surface and three fathoms, were obtained from the surface float and the meter record. From three fathoms downwards, the results were obtained by the deep fan as already explained. Many of the individual results given at the different depths, were careful averages, or were taken twice, or checked by both meter and fan. Any results in which there was any uncertainty, from the swinging of the ship or other causes, are omitted; and in this way some of the longer intervals of time for which no observations are given, are accounted for.

In reviewing the results obtained at the different stations we may first notice those at station C, as this is a typical station in the central part of the region under consideration. It will thus serve to illustrate the nature of the currents in the open waters, as this station lies 18 miles off Cape Whittle. It was also occupied twice,

for five days in July and four days in August. Continuous records were thus obtained for 89 hours in July and 87 hours in August, or 176 hours in all.

The way in which the current veers completely around the compass is very noticeable. (See Plate III.) From 27th July, at 14 o'clock, till 30th July, at 5 o'clock, the current in 63 hours veered completely round *four* times. This veering was right-handed or in the direction of the hands of the clock; and the period of one complete revolution was 16 hours on the average. During the same time there were *five* complete tides from high water to high water, occupying 61 hours in all, or on the average the usual tidal period of a little over 12 hours. This was followed by three oscillations in the direction of the current from S.E. to N.E. during the succeeding 24 hours. As the veering of the current occupied a longer period than the tidal intervals, the direction of the current was necessarily out of relation with the time of the tide, but the regular character of the veering may be taken as an indication of tidal influence. This is the more probable, as the more regular veering was immediately after spring tides, and the later oscillations in the current were towards the neaps.

In August the station was again occupied from the 12th to the 15th. This was shortly after the spring tides, as the moon was new on the 9th. As the weather was also very calm, the tidal character of the current was more distinct than before. During the rise of the tide the set of the current ranged from west to north, and judging by the day observations, when the average direction between the surface and 18 feet was obtained, the dominant set during the rise of the tide was to the N.N.W. During the fall of the tide, the direction of the current is more irregular and fluctuating, but it may probably be taken as ranging usually from west to south. A time of veering and slack water is also noticeable about high water and low water. The velocity of the current did not exceed one knot per hour in any direction.

We thus find that while there is least wind disturbance, the surface current makes on the whole in westward directions, although it veers and fluctuates as just described, under the influence of the tide. But when the influence of the wind is also taken into account, the actual set of the surface current is very nearly equal in every direction. This will be seen by comparing the directions of the current during each of the two periods in July and August taken separately, with the total or combined results of all the observations. The directions in each period by itself are shown near the lower right hand corner of the chart, Plate I.; and the combination of the two periods is shown at the true position of station C on the chart. The period in August may be taken to show the direction of the set while undisturbed, and including only the veer produced by the tide, as the weather was then very calm. The prevailing direction of the wind during the summer season is south-westerly, and this season the wind was more constantly than usual in that quarter. It appears, therefore, that the influence of this wind when combined with the tendency of the current to set dominantly to the westward, produces an actual set which on the whole is nearly equal in every direction.

This tendency of the current to set to the westward, is more distinctly shown by the under-current, as it is less influenced by the wind. The set of the under-current at 20 and 30 fathoms ranged usually from west to north, or in a general north-westward direction. That this was its dominant direction will be seen in the following table, which is condensed from all the under-current observations of July and August, given in Table II. The figures are the sums of the velocities in knots in each direction, whenever any current was found; which is sufficient for comparative purposes.

STATION C.—Direction of the under-current at 20 and 30 fathoms.

	S.	S. W.	W.	N. W.	N.	N. E.	E.	S. E.
In July.....	0·4	0·0	1·2	1·9	0·8	0·8	0·9	0·4
In August.....	0·4	0·3	0·4	0·4	1·0	0·3	0·2	0·0
Total.....	0·8	0·3	1·6	2·3	1·8	1·1	1·1	0·4

The under-current thus makes in a dominant direction, while the surface current usually veers in all directions, and during any short period there is, therefore, no relation discernible between them. The directions of the under-current, when classed according to the rise and fall of the tide, fail to show any tidal character. If there is any tidal influence it is so obscure as to be indeterminate.

Station A, half way between East Cape and Natashquan Point, in the middle of the channel north of Anticosti, was occupied without interruption from 8th to 15th July, and continuous observations were obtained during 130 hours. The current was found to veer completely around the compass, and the direction in which the veering took place was right-handed, as at station C. The period of a complete revolution was not quite so definite, but it ranged from 14 to 18 hours, which was much the same on the average. As the period is again longer than the tidal interval between successive high waters, the current at this station also is necessarily out of relation with the tide. The only other distinct feature which this current shows is the tendency to make to the southward of a line lying east and west, rather than to the northward. (See Table I.) The direction of the surface current is thus outward from the channel north of Anticosti, and a comparison will be given further on, to show its amount with reference to the influence of the wind.

Station B, at 24 miles S.E. of Heath Point, Anticosti, was occupied from 15th to 23rd July; and station H, in the same vicinity (13 miles S.E. of Heath Point), was occupied several times between the 16th and 26th September, as already mentioned. The total time during which observations were obtained here in the two months was 180 hours. It was expected that tidal influence would be more felt here, as this position is near the main entrance to the St. Lawrence. The surface current showed much the same character, however, as that already described at the other stations. The direction of the current would sometimes veer completely round the compass in about 16 hours; and it would also make a half revolution in 8 or 10 hours. This veering was usually right-handed, but there was sometimes also a left-handed veer from S.E. to E. While veering in this way, the current would sometimes set directly towards or from the end of the Island of Anticosti for as much as three hours at a time. A persistent set to the eastward for 8 or 10 hours at a time is also very noticeable. Once or twice also there was a sudden reversal of the set from the eastward to the westward. (See Plate II.) The more continuous observations of July showed the more dominant set to be between N.E. and S.E. In September the current veered much in the same way, and occupied about 9 hours in making a half revolution, either in a right-handed or left-handed direction. The velocity in July was not more than one knot; but in September it exceeded one knot on the 21st and 24th. This was probably due to the influence of the heavier winds in that month.

At Stations B and H, fifty-seven observations of the direction of the under-current at 20 and 30 fathoms, were obtained in July and September. (See Table II.) These were all classified in relation to the time of high and low water, at South-west Point, with the following result: A slack time in the under-current was found on seven occasions, which occurred at half tide, either rising or falling. For three hours before and after low water the under-current makes on the whole to the north-eastward and eastward, its direction ranging from N. by W. to E.S.E.; and for three hours before and after high water, it makes on the whole to the south-westward and westward, its direction ranging from S. to N.W. In the fifty observations in which the current had a definite direction, there were only four exceptions to the above rule; and these occurred near to the time of half tide, rising or falling.

The following table shows the relation between the tide and the direction of the under-current. The period of three hours before and after high-water is indicated as "H.W." and the remaining period before and after low-water as "L.W." The figures give the number of times that the under-current set in the directions indicated, out of the 50 observations obtained.

STATIONS B AND H. Direction of the under-current at 20 and 30 fathoms, in relation to the tide.

Period.	N.N.W.	N.	N.N.E.	N.E.	E.N.E.	E.	E.S.E.	S.E.
"H.W."	0	0	0	1	0	1	0	0
"L.W."	0	5	4	4	3	2	2	0

Period.	S.S.E.	S.	S.S.W.	S.W.	W.S.W.	W.	W.N.W.	N.W.
"H.W."	0	3	3	2	7	8	2	1
"L.W."	0	0	0	0	0	1	0	1

It thus appears that the under-current has a definite set in two directions in accordance with the tide, while the surface current continues to veer completely round in such a way as to be quite out of relation with the tide. The two dominant directions of this set are, to the W.S.W. while the tide is high, and to the N.E. while the tide is low. These directions are nearly across the end of Anticosti Island. To determine the true relative amounts of the set in these two opposite directions, the average velocity of the under-current towards each of the points above given, was first found from all the observations obtained at Stations B and H; the amount by which the current makes towards the N.E. and W.S.W. respectively, was then carefully computed; (by adding together the components of these average velocities as projected on axes lying in these two directions). When finally reduced to a percentage for convenience in comparison, the result is as follows:—

Amount by which the under-current makes towards the N.E. = 100.

Amount by which the under-current makes towards the W.S.W. = 116.

This shows that the amount by which the under-current makes to the W.S.W. is 16 per cent greater than towards the N.E. The water thus makes to the westward on the whole, around the east end of Anticosti; which is very significant in relation to the general circulation, and in showing also the direction from which the water comes, which forms the return flow to make up for the Gaspé Current. (See report of progress, April 1896; pages 27 and 28.)

Station D was situated at 15 miles S. by W. of Great Mecatina Island, and its position was fixed from the beacon on Flat Island. It was occupied during six complete tides, from August 19th to 22nd. The current was very irregular in its direction, however; and the only indication of tidal influence is that it appears to set more steadily to the southward about the time of high water, and to be slack and variable about the time of low water, but these indications are obscure owing to the irregularities which occur. The dominant direction of the set is thus to the southward, and this direction is off shore. The under-current however, at 20 and 30 fathoms, makes very constantly along shore to the south-westward. This is important with relation to the general circulation in the Gulf.

At Station E, 13 miles off Shecatia Bay, observations were only obtained during two complete tides, or 30 hours in all, owing to interruption from rough weather. Where the irregularity is so great, this time is too short to give any relation with the tide. The direction of the under-current was both to the S.W. and N.E., but more frequently to the S.W. The change in direction might prove to be due to tidal influence, as this station may be near enough to the Strait of Belle Isle to be affected by its tides.

At Station F, 10 miles N.N.W. of Rich Point, the tidal element is distinct. The ebb and flood run alternately in nearly opposite directions, as shown on the chart, Plate I. The turn of the tide is felt first in the under-current which makes its way up to the surface and replaces the former direction of the surface current, in a way that often occurs in tidal currents at some distance off shore. This station lies between the influence of the constant current which follows the west coast of Newfoundland, and the tidal influence of the Strait of Belle Isle. It is probably for this

reason that the directions of the ebb and flood are nearly at right angles to the trend of the shore, and not because of the proximity of this station to St. John's Bay.

Station G is situated off the long stretch of straight coast on the west side of Newfoundland. It is at 12 miles E.N.E. of Cow Head, and was occupied several times from the 3rd to the 14th of September; shelter being found meanwhile in Bonne Bay, when the weather was too rough to obtain results. The total time secured at this station was 72 hours. The current here sets almost always to the north-eastward, and very seldom veers in direction through a wider range than from N.N.W. to E. When at the one extreme of this range, it sets directly off shore; and on one occasion it set on shore to the S.E. by E., during $3\frac{1}{2}$ hours. The relative frequency of these directions is shown on the chart, Plate I.; and also the evidently dominant direction of the current along the shore to the north-east. In the under-current, this direction is even more definite. At 20 and 30 fathoms, it does not veer through a greater range than from N. to E.; and even at 10 fathoms, the dominant direction is better maintained than by the surface current. At this station, it is not unusual for the whole of the current from the surface to 30 fathoms, to set in the same direction for three hours at a time, especially when this direction is N.E. or E.N.E.; and it is then also strongest, its velocity being nearly one knot at the surface, and falling off to half a knot at 30 fathoms. This is the only station at which the current showed so definite and constant a character.

Some instances of the relation of the under-current to the surface current may also be given to illustrate the way in which changes may pass from the one to the other. The e may best be taken from the observations at stations B, H and C. (See under-current observations, Table II.) There is at times a distinct difference in the current, between the surface and three fathoms, especially when the current is changing. The current may slack off first at the surface, while it still retains considerable strength at three fathoms. This could sometimes be observed very distinctly on calm days; when the surface of the water was found to be quite still as shown by floating objects, while the meter and fan agreed in showing a current of as much as half a knot at three fathoms. (See Table II.; station B, 21st July; station C, 12th August; &c.) This may occur when the under-current is making its way up to the surface. At station B, on 21st July, the line at which the under-current struck up to the surface could be seen as a distinct current rip, which approached gradually, and on reaching the vessel carried objects in its current which had been floating around it for an hour previously.

On the other hand the surface current itself may consist of a comparatively thin layer, only 5 or 10 fathoms in thickness; and below this the water may be quiescent. A number of instances of this will be noticed in Table II.; as it is much more usual than to have the surface layer at rest, with a distinct under-current running immediately below it. Such a surface current may even set in after a slack time, by a moving layer making its way over the surface of the water. This once occurred on 13th August at station C. The day was very calm and the edge of the moving surface water was visible as a distinct line or current rip. This came up to the point of observation at 16:30; and it was over two hours afterwards before the new current could be felt as far down as 10 fathoms. These changes are remarkable, so far from shore as 18 and 24 miles, and when the currents themselves do not exceed one knot in their speed.

When it is the surface layer only which is in motion, its thickness is sometimes very distinctly marked. At station H, on the afternoon of 24th September, when the current was as strong as ever observed, its velocity fell sharply at a depth of 12 fathoms, from over one knot to less than half a knot per hour. For over an hour the current thus remained slow at 13 fathoms and below; while very strong from 11 fathoms upwards.

It may also happen that the only movement of the water is in a layer at a depth of 10 or 20 fathoms; while the water at the surface and below is quite still. (See station G, 14th September). At times also there is a bottom current at 40 or 50 fathoms, which may have a direction of its own. As a result of these movements at various depths, the current sometimes had what may be called a spiral character;

or an apparent veering in direction with the depth from the surface downwards, at any given moment. As time went on, the under-current usually veered the same way as the surface current, although several points behind it in direction; but instances of these currents veering in opposite directions were not unknown.

These changes in the depth of the water will help to explain the changes in the surface current itself. They also show that the drift of the mere surface layer of a few inches or a foot in thickness, may not represent correctly the direction in which the current will set a vessel of ordinary draught. If the currents in such waters are ever examined by means of drifting floats, these should consist of spars floating upright in the water, and reaching to the same depth as the average draught of the vessels for which it is desired to ascertain the set of the current. Such spars would of course require to be weighted at their lower ends, and to have a hollow ball or a disc of wood at the upper end to keep them from sinking, and to avoid any exposure of surface to the wind.

Shore Currents in the Channel north of Anticosti.—The direction of the current off East Cape, Anticosti, was observed during the day time from 7th July to 10th August. The current sets north or south along the shore; and its direction was indicated by two buoys attached to each other as already explained. These buoys were placed $1\frac{1}{2}$ miles off the cape, in 30 fathoms of water. The direction of the current was noted every two hours from 5 or 6 a.m. to 7 or 8 p.m. and also the time at which the currents changed in direction. The shore runs north and south; and the current was nearly parallel to it. But it was very irregular, as sometimes it set in the same direction all day, for two or three days in succession; and it was comparatively seldom that there were two changes of direction during the day, as in the case of ordinary tidal currents. A summary of the observations obtained on twenty-three complete days in clear weather, during the above time, gives the following result:—

On nine days, the current ran in the same direction all day, either north or south.

On nine days, one change in direction occurred.

On five days, the direction changed twice.

It is, therefore, clear that in these circumstances it is not possible to make out any relation between the current and the tide. On the other hand, the observations show that the prevailing set of the current is to the southward. The total number of times that the direction of the current was noted was 231; and out of this number the set of the current in each direction was as follows:—

Current setting to the northward	78 times.
Current setting to the southward	153 do

This may be taken as a fair comparison; as during the course of a little more than a full month, the observations are distributed pretty evenly over all the states of the tide.

At Natashquan Point on the other side of the channel north of Anticosti, the direction of the current was obtained in the same way, by means of buoys. The observations were more continuous, extending from 9th July to 19th September and including the time of daylight on each day. The direction of the current was usually north-west or south-east; although it sometimes veered two points or more from these directions. This is parallel to the general direction of the coast. The current sometimes ran in the same direction all day, for two or three days in succession; and this feature was even more noticeable here than at East Cape. When a change in direction occurred, it took place at any time, without reference to the time of the tide.

In classifying the whole of the observations with relation to the rise and fall of the tide, it appears that during the rise of the tide the set of the current is very nearly equal in each direction; but during the fall of the tide, the set to the south-east largely predominates. This is, therefore, the dominant direction on the whole. The direction of the current was noted 627 times in all; and out of this number, the set of the current in each direction was as follows:—

In directions between N. and W.	218 times.
do S. and E.	409 do

The set of the current is thus distinctly outwards on the whole, in much the same proportion as at East Cape. The "constant currents" shown locally on the Admiralty charts at these points, must therefore be taken to mean that the current sets in the direction indicated about twice as often as in the contrary direction. We will refer again to the relation of these currents to the general circulation.

Influence of the Wind. In moderate weather, when the wind was light and variable, or blowing steadily in one direction, the current would veer completely round the compass as already described. The only effect, therefore, which it would be possible to attribute to the wind, in the tendency of the current to set in some dominant direction. The best comparison of this character which can be made is at Station A. This was the most open of all the stations, as it was 35 miles from the land on either side; and the direction and mileage of the wind were, therefore, well observed on board. Also, the direction of the current as observed at this station, was the direction on the surface only, where it is most under the influence of the wind. The set of the current (see Plate I.) was mostly to the south-east; and least towards the N.W. and N. The total mileage of the wind while the station was occupied, from 8th to 15th July, was 1,967 miles during 156 hours; or only 12 miles an hour on the average. The mileage of the wind in each direction is given below, in comparison with the set of the current as observed during 130 hours. (The figures for the current are the number of half hours in each direction, as in Table I. There were 8 hours of calm, and 25 half-hours of no current, which are omitted in the comparison. The directions are magnetic throughout.)

Mileage of wind	S. 125	S.W. 332	W. 359	N.W. 955	N. 79	N.E. 28	E. 16	S.E. 73
Set of current	N. 13	N.E. 18	E. 37	S.E. 50	S. 40	S.W. 37	W. 28	N.W. 12

This comparison shows a distinct correspondence between the wind and the more usual direction of the current. It may, therefore, be taken to indicate the general influence of the wind, when a long period is taken as a whole, to cause a leading drift or set in its own direction. It is to be noted, however, that during any shorter period the current was veering round continually, while the wind often maintained a steady direction.

At station B, and at C in the month of July, the dominant direction of the surface current also accords in general with the direction of the greatest mileage of wind at the time. At these stations the tide has a greater influence relatively to the wind than at A; but the influence of the wind is still sufficient to overcome in the surface current the tendency which the water there has to move in other directions, which are indicated by the under-current. This will be seen from the following tables, which give the comparison between the wind and current in the same way as for station A. The comparison at station B is for a period of 107 hours, from 17th to 23rd July, in which 11 hours of no current are omitted; and at station C, for a period of 90 hours, from 27th to 31st July, in which $1\frac{1}{2}$ hours of no current are omitted.

STATION B.—Mileage of wind	E. 0	S.E. 0	S. 311	S.W. 941	W. 355	N.W. 195	N. 87	N.E. 0
Set of current	W. 12	N.W. 8	N. 16	N.E. 41	E. 65	S.E. 30	S. 15	S.W. 5
STATION C.—Mileage of wind	E. 0	S.E. 0	S. 30	S.W. 1147	W. 325	N.W. 0	N. 0	N.E. 42
Set of current	W. 9	N.W. 6	N. 22	N.E. 45	E. 35	S.E. 36	S. 18	S.W. 6

During the month of July, the heaviest wind at any of the stations was on the 30th at station C. From 14 o'clock on the 29th to 20 o'clock on the 30th the wind blew steadily from S.W. by W. The total mileage from that direction was 659 miles in 30 hours; yet this amount did not increase the thickness of the current beyond 10 fathoms. On the 30th, from 8 to 20 o'clock, the rate of the wind was 26 miles per hour. During that time the current set as shown below; the only exceptional feature was a left-handed veer from S.S.E. through E. to N.E. This may have been due to the wind; although it veered back to S.E. while the wind maintained the same direction, and continued to increase.

July 30th.	Hour.....	8	10	12	14	16	18	20
	Set of Current.	S.S.E.	S.E.	E.S.E.	E.	N.E.	E.	S.E.

The heavy winds above mentioned increased to a gale on 31st July and 1st August. There was also heavy weather in the middle of the month; but there was no opportunity to occupy a station immediately afterwards on either occasion.

In the windy weather of September, good observations could not be obtained in the early part of the month while at station G; as Bonne Bay was used as a harbour in rough weather, and the mountains around it made wind observations unreliable. There is no permanent meteorological station in that region. The off and on-shore directions of the current occurred, however, at such times as to make it possible that these were due to the effect of wind or barometer.

The best examples of heavy winds were obtained in September at station H, off Heath Point, where there is little or no shelter to be had. On 21st September there was a strong westerly wind, which changed at midnight to N.E., and veered by the morning of the 22nd to nearly E. The current on one of these days veered in the usual right-handed direction, and on the other the veer for some hours was in the reverse direction. A comparison of the wind and current are given below:—

Sept. 21st.	Hour.....	9.00	11.00	13.30	16.00	Wind velocity during 8 hours; 25 miles per hour.
	Direction of wind..	W.	W. by S.	W.S.W.	W. by S.	
	Set of current.....	E.	S.E.	S.	S.W.	

Sept. 22nd.	Hour.....	10.00	11.00	13.00	14.00	Wind velocity during 8 hours; 26 miles per hour.
	Direction of wind..	E. by N.	E.	E. by N.	E. by N.	
	Set of current.....	N.W.	N.W. by W.	W.N.W.	W.	

On the night of the 22nd and during the 23rd, the wind increased to a gale from the E. and N.E. Its rate was over 50 miles an hour; and the waves reached a height of 14 feet and a length of 180 feet from crest to crest. The total mileage of wind from an easterly direction during 32 hours, up to 16 o'clock on the 23rd, was 1,163 miles. The wind then moderated, and backed into the north; and during the following day, the 24th, it varied between N. and W.N.W., with an average rate of only 15 miles per hour. The current on that day, from 9 to 21 o'clock, veered from N.E. through S.E. and S. to S.W. It thus made half a revolution in the usual right-handed direction in 12 hours. The current in the morning was setting against the direction of the heavy wind of the previous day. It also veered during the day to the right, while the wind backed to the left; and by evening it was setting directly across the new direction which the wind then had. It is, therefore, difficult to know what effect to attribute to the influence of the wind; unless it be that in backing against the usual direction in which the current veers, it may have lengthened its period of rotation.

Throughout the night of the 24th the wind averaged 26 miles an hour for 12 hours, and it veered again from N.W. to N.N.E. On the 25th the wind fell off during the forenoon to a calm; and towards evening it set in as a light breeze from the S.W. The current in the morning was W.N.W. and from 10.30 to 18.30 it veered to the left, making a half revolution from N.W. through south-west to S.E. in 8 hours. The current in the morning was thus nearly contrary in direction to the strong wind of the previous night; and during the day it veered round in the reverse direction to that which the wind had taken. Also both morning and evening the current was setting at right angles to the direction of the wind which was blowing at the time.

From these examples, when strong winds were best observed, and stations were occupied at the time or immediately afterwards, it is quite evident that the current does not run in the same direction as the wind which is blowing locally at the time. On the contrary, the current continues to veer as usual; although its movements appear to be more disturbed; and the strength of the current was also greatest during windy weather. The current at any given time may thus set in any direction quite irrespective of the wind; while on the other hand it is to be inferred that when continuous observations can be obtained for as long a period as a week, it would be found that the greatest amount of set had taken place in the same general direction as the greatest total mileage of wind.

Usual veer of the current in relation to wind and tide.—If we look for an explanation of both features which these currents show, it might, therefore, seem reasonable to attribute the veering in the direction of the current to tidal influence; and to consider any tendency of the current to set in a dominant direction as due to the influence of the wind. The difficulty in adopting this view is, that the period in which the current veers completely round is 16 hours on the average, at the more open stations. The period is thus nearly four hours longer than the tidal period of about 12 hours; and this difference in the two periods results practically in an entire want of relation between the direction of the current and the time of the tide.

It is possible to suppose that the longer period of 16 hours is of the nature of an over-run, which is brought into harmony with the tidal period by the time occupied in veering in the reverse or left-handed direction which sometimes occurs. The observations do not favour this view; as it is during the least disturbed periods and also when the tidal influence is greatest, that the 16-hour period is most distinct. But if this should prove to be the case, some explanation might be found in the tidal interference between the tide entering the Strait of Belle Isle and the main tide of the Gulf of St. Lawrence which enters through Cabot Strait. Otherwise we must look for some cause which is capable of lengthening the ordinary tidal period by retarding the rate of veer in the current itself.

The period could not be lengthened by the combined effect of a tidal rotation and a wind drift. The effect of a steady wind on a current which was veering continually with the tide, would be to make it set more strongly and veer more slowly when it ran with the wind; and to be slacker and veer more rapidly when setting against the wind. But it would be impossible for a steady wind, or the surface drift which it produced, to alter the period of rotation, or the time which the current would take to veer completely round.

This period could only be lengthened by combination with another rotation in the contrary direction. If the wind itself were to back round continually to the left after the manner of a perpetual storm, it might produce this result. It is possible that the veering or backing of the wind may at times have an appreciable effect; and it is fair to remark that in the northern part of the Gulf of St. Lawrence, the wind as a rule backs to the left during storms, and thus tends to lengthen the period of veer in the current.

The only left-handed rotation of a constant character which we know of, is the general circulation in the Gulf itself, which we will see to be pretty conclusively proved when all the information available is considered together. It is difficult to say whether a slow circulation of this kind would have an appreciable effect on the veering of the current; but it may at least be allowable to point out that the lengthening of the

tidal period which we here meet with, accords with the opposite direction in which this general circulation takes place; and so far as our information goes, these two features are consistent and help to explain each other.

DENSITIES AND TEMPERATURES.

Throughout the region under consideration, the density of the surface water is higher and much more uniform than in the remainder of the Gulf. There were times, however, when lower densities were found in the neighbourhood of the eastern end of Anticosti. With this exception, the density of the surface water in the whole area lying to the north-east of a line from Cape Ray to Heath Point, and including the channel north of Anticosti, varies only from 1.0234 to 1.0242. This is based upon 231 determinations made throughout this region on all the courses run in July, August and September. It was very rare to find densities below the lower of these limits, except locally near the mouths of rivers. In the western end of the Strait of Belle Isle itself (off Forteau Bay at the beginning of September) the surface density was 1.0239 to 1.0241. These densities are the true specific gravity of the water at 60° Fahrenheit, determined with the same precautions to ensure accuracy as formerly used.

This result is important, in showing that the lower densities found in the south-western portion of the Gulf of St. Lawrence are confined to that side; and this further confirms the conclusion already reached last season, that the general set or drift across the Gulf, as shown by the water of lower density, is in the direction of a line from Gaspé to Cape North. (See general chart of density of water in the south-western portion of Gulf of St. Lawrence, Plate III., in Report of Progress of 13th April, 1896.)

The density in the open Atlantic, from seven determinations made at the end of June off the south and south-east coasts of Nova Scotia, was found to range from 1.0237 to 1.0242, which is practically the same as in this north-eastern portion of the Gulf. It may, therefore, be stated broadly, with regard to these two divisions of the Gulf, that throughout the north-eastern portion the average surface density ranges from 1.0235 to nearly 1.0245; while in the south-western portion, the density is below 1.0235, ranging usually down to 1.0220, and falling in the Gaspé Current itself to 1.0210. The dividing line between these two portions of the Gulf, runs approximately from the east end of Anticosti, to a point in the middle of Cabot Strait, about 20 miles west of Cape Ray. The densities in the border region near this dividing line, vary to some extent, just as the other lines of equal density elsewhere vary in their position.

On the other hand, the endeavour to obtain some differences locally, which would correspond with the various directions of the current, was without result; although a large number of temperatures as well as densities were taken at the various stations for this purpose.

The best observations to ascertain the amount of change in the temperature of the surface water with the season, were obtained at a series of points, five miles apart, on each of the following lines:—(1.) From 30 miles off Heath Point, to Cape St. George on 6th July. (2.) From station C, off Cape Whittle, to the offing of Cape St. George, on 3rd August. (3.) Same line as No. 1, run a second time on 28th September. The results were as follows:—

- (1.) July 6th. From $49\frac{1}{2}^{\circ}$ to $51\frac{1}{2}^{\circ}$. Average = $50^{\circ}.93$.
- (2.) August 3rd. From 50° to 54° . Average = $52^{\circ}.68$.
- (3.) September 28th. From 52° to $54\frac{1}{2}^{\circ}$. Average = $53^{\circ}.62$.

The following deep densities will also serve to show how closely they correspond with those found in previous seasons in other parts of the Gulf, at the same depths. (See Report of Progress, 13th April, 1896; p. 7, and tables A. to F.) Densities at these depths were also obtained for comparison in the open Atlantic off the Nova Scotia coast. These were taken at six points, at ten to fifteen miles from shore, on

a course from the offing of Liverpool Bay, past Halifax, to 13 miles east of Cape Canso.

DEEP DENSITIES in the Atlantic, and in the north-eastern portion of the Gulf of St. Lawrence.

Locality.	Surface.	10 Fathoms.	20 Fathoms.	30 Fathoms.	50 Fathoms.	100 Fathoms.
In the Atlantic off Nova Scotia, June 30th, and July 1st, 1896.....	1·0240	1·0243	1·0245	1·0246	1·0245	
	1·0240	1·0243	.....	1·0246	
	1·0237	1·0243	1·0245	.....	
	1·0239	1·0243	1·0244	.....	
	1·0239	.....	1·0243	1·0243	
	1·0237	1·0239	.....	1·0243	
Station A.—July 10th.....	1·0234	1·0240	1·0243	1·0243	1·0246	1·0253
July 14th.....	1·0235	1·0239	1·0242	1·0245	1·0247	1·0255
Station D.—Aug. 21st.....	1·0236	1·0237	1·0242	1·0245	1·0248	
Aug. 22nd.....	1·0236	1·0239	1·0244	1·0246		
Station E.—Aug. 24th.....	.....	1·0241	.....	1·0245
At 7 miles south of station E.	1·0239	1·0240	1·0248	1·0248	
At 21 miles south of station E.	1·0235	1·0241	.....	1·0248	
Station F.—Aug. 28th. Morning.....	1·0236	1·0241	1·0245	1·0248		
Aug. 28th. Afternoon.....	1·0238	1·0240	1·0247	1·0247	1·0245	
Across the Strait of Belle Isle. Three points, 3 miles apart, Sept. 1st, 1896 {	1·0239	1·0240	.....	1·0245	
	1·0240	1·0240	1·0243	.....	
	1·0239	1·0241	1·0244	.....	
Station G.—Sept. 10th.....	1·0240	1·0240	1·0242	1·0246	1·0247	
Sept. 14th.....	1·0238	1·0239	1·0243	1·0247		
Station H.—Sept. 21st.....	1·0240	1·0244	1·0246	.....	
Sept. 24th.....	1·0235	1·0238	1·0247	1·0247	1·0247	
Sept. 25th.....	1·0235	1·0239	1·0246	1·0247		

The deep temperatures obtained show that in this region as elsewhere in the Gulf, the cold layer occurs at a depth of about 50 fathoms. The three points in the Strait of Belle Isle are on a line running across the strait from Amour Point to Green Island; in the same part of the strait in which the detailed examinations of 1894 were made.

Depth.	Station A.	Station D.		Strait of Belle Isle, Sept. 1st. Three points, 3 miles apart.		
	July 10th.	Aug. 20th.	Aug. 22nd.			
	°	°	°	°	°	°
Surface.....	50	54	55	52	53	57
10 fathoms.....	42	51	51	46	51	55
20 do.....	34	44	40	40	38	48
30 do.....	31½	36	38	.....	37	39
40 do.....	.....	31	35	.....	.....	.....
50 do.....	31	.....	.....	.....	.....	.....
75 do.....	31½	.....	.....	.....	.....	.....
100 do.....	36½	.....	.....	.....	.....	.....

INFORMATION OBTAINED REGARDING CURRENTS.

A considerable amount of information of value was collected during the season, with regard to the currents in this part of the Gulf. By taking advantage of the stormy weather, this was obtained with little loss of time to the main work in hand.

The fishermen were able to give the best information, because they anchor their boats, and thus have a fixed point from which to observe; while the masters of trading schooners have difficulty in distinguishing current from lee-way. On the other hand, sealing schooners which lie in the ice and drift with it, can often give satisfactory information. In obtaining information from the fishermen, care was taken to see that they described the currents as found at some miles off the open coast, away from the vicinity of large bays, or channels between islands, where currents of a local character might occur. By questioning the men of longer experience, and comparing their statements, reliable results could be arrived at.

Drift of the ice as an indication.—The currents in the early spring (March and April) are often well indicated by the drift of the ice, and numbers of small vessels are then engaged in seal fishing. It is necessary, however, to distinguish between the different kinds of ice which are met with, and also to keep in mind the difference in the movements of the surface water and the under-currents, as already explained; as otherwise the inferences drawn from the drift of ice may be far from correct.

The ice met with is of three kinds:—(1) Berg ice, or the true icebergs which come into the Gulf through the Strait of Belle Isle. They are also found off the south coast of Newfoundland, nearly as far west as Cabot Strait. (2) Flat or pan ice, forming fields or in broken pieces, usually not more than 6 feet in thickness, but sometimes as thick as 10 feet. This often jams or shoves along the shore or between islands, and may form masses 20 feet or more in thickness, but it can never be mistaken for berg ice. In this flat ice a distinction is sometimes made between "Northern ice," which finds its way in through the Strait of Belle Isle under certain conditions, and "Gulf ice," which forms in the Gulf itself. As the effect of the wind and current upon it is the same in either case, the distinction is not of importance for our present purpose. (3) River ice, from the St. Lawrence River and its estuary. This is also flat ice, and in the Gaspé region it can be readily distinguished by its appearance from the Gulf ice. It is not found, however, in the region which we are now considering.

The berg ice, from its great depth in the water, will evidently move with the under-current; and it will not be appreciably affected by the wind. These bergs do not necessarily indicate the direction of the current as affecting shipping, except when the surface current has also the same direction, which is not usual. They show in reality the average direction which the current has, between the surface and the depth of their draught. This draught is limited to about 35 fathoms by the depth of the strait. They are thus of much value as an indication of the general movement or circulation of the water.

The relation of the flat ice to the wind and current requires some little consideration. It is, of course, just as true of this ice as of the berg ice, that the greater part is under water; but as it is almost always in broken pieces, more or less piled and with upturned edges, the wind has a much greater hold upon it in proportion to its total weight, than on the berg ice. Even when this is allowed for, its depth in the water still gives the current a greater hold upon it than the wind has. For example, if such ice is drifting with a current in a given direction, and the wind is blowing across that direction at right angles, the ice will seldom be set more than two points, or three at the most, off the true direction of the current. When the ice becomes soggy or water-soaked and loses its edges, as it does later in the spring, it will set still more correctly with the current.

When the surface current itself is moving in the direction of long continued or prevalent winds, as it often does in this region, the ice naturally follows the same direction too. Also in regions where the current is tidal, and the ice in calm weather would drift as far in the one direction with the flood tide as in the other direction with the ebb, the direction in which it makes on the whole will depend upon the wind. It is probably for these reasons that it is so often said that the ice drifts with the wind; although this merely expresses the fact, without distinguishing between the relative influence of the wind and the current upon it.

There is also a direct effect which the ice has upon the strength of the current in regions where the direction of the surface drift is under the influence of the wind.

The broken and upturned edges of the ice give the wind a much greater hold upon the water than it otherwise would have. Hence during long continued winds the velocity of the current is appreciably greater than if the ice were not present. This is undoubtedly the explanation of the common belief which is expressed by saying that "the ice makes its own current." It may be well to recall that the weight of the ice itself is the same as the water which it displaces, and, therefore, the wind has no greater mass to set in motion in producing a surface current than if the ice were to melt and refill the hollow which it makes in the water; while the presence of the ice gives the wind a better hold than it would have upon the surface of open water, free from ice.

There is one condition of the ice which may prevent it from showing correctly the drift of the water. When it is set against an island or headland and packed together for a long distance out, with open water beyond, it may circle round as on a pivot. The outer edge of the pack may thus make a long sweep very different in its path from the true set of the current; and its movements also become irregular, as vessels caught in such ice which are near together in the evening may be ten or fifteen miles apart in the morning.

Current and wind.—There is one relation between the wind and the strength of the current which was not observed at the stations, but which is so generally stated to be the case that it must be accepted as a fact. It appears to apply chiefly, if not entirely, to currents which are fairly constant in their direction. Such a current is found to run more strongly before the wind comes, if the wind is to be in the same direction, and it slackens if the wind is to be against the current. The fishermen when anchored in their boats take these indications as warnings of the approach of heavy weather. This change in the current before heavy winds is found to occur on the south and west coasts of Newfoundland, and has also been noticed on the north shore of the Gulf of St. Lawrence. It appears to be due to the action of the wind during storms, in first holding back the water and then releasing it, and the low pressure area of the storm as it passes along also increases the result. It is also probable that the effect is more distinct in the case of confined waters, as it is very noticeable on the Great Lakes. It is from analogy with the conditions which obtain there that this explanation is suggested.

The information which was obtained with regard to the currents, was kindly furnished by the following persons:—

Captain Farquhar, of the SS. "Harlaw," which makes regular trips during the summer and autumn along the south and west coasts of Newfoundland. He has also been engaged in sealing in the Gulf in the spring.

George Curtis, for the last thirty years, has made three trips in the Gulf each season in a schooner; sealing in the spring, cod fishing in the summer, and herring fishing in the autumn.

Jonathan Noel, who has had a long experience in the Gulf as master of a sealing and trading schooner.

Also four masters of schooners, Wadman of Rose Blanche, Newfoundland; Isaac Shepherds of Bay of Islands; and two others.

On the west coast of Newfoundland, Jonas Shears, John Parsons and William Young, fishermen of long experience at Roche Harbour on the open coast at the mouth of Bonne Bay. Also fishermen of Whale Cove in Bonne Bay, Lark Harbour in the Bay of Islands, and Cow Head Harbour; who fish some miles off shore.

In the Strait of Belle Isle, Mr. T. M. Wyatt, lightkeeper at Amour Point, and Charles Davis, a resident of Forteau Bay. Also a fisherman engaged for the last thirteen years at the fishing establishment at Schooner Cove, Loup Bay.

Sam Gaumond, the only permanent resident on Great Mecattina Island. He has now lived there for many years.

Several fishermen at Natashquan Point and little Natashquan village.

Two fishermen, old residents of Fox Bay, near the east end of Anticosti; who are also well acquainted with the neighbouring coasts.

Mr. Z. Gagné, lightkeeper at Heath Point.

GENERAL CHARACTER OF THE CURRENTS IN THE NORTH-EASTERN HALF OF THE GULF.

We may now consider these currents as a whole, and trace their movements throughout the north-eastern half of the Gulf of St. Lawrence; and we will base this consideration upon the observations of this season as already detailed, supplemented by the information obtained, and the notes made by the captains of trans-Atlantic steamships. It will be best to begin with Cabot Strait itself, where the main interchange of water between the Gulf and the Ocean takes place.

Currents on the south coast of Newfoundland, and in Cabot Strait.—On the south coast of Newfoundland between St. Pierre Island and Cape Ray, the current makes to the westward, and passes around Cape Ray into the Gulf. This was found to be the case at the stations off Cape Ray where observations were taken in 1894 and 1895; and it is also shown by icebergs off St. Pierre Island, which make westward even against a north-west wind. It is stated in the Sailing Directions that when approaching the entrance to the Gulf of St. Lawrence (by Cabot Strait), the current generally sets to the southward on the Cape Breton Island side of the strait; but on the Newfoundland shore it has frequently been found setting to the northward about one knot an hour. (St. Lawrence Pilot, vol. II, 1895; page 12).

Captain Farquahar, of the SS. "Harlaw," which passes through these waters on its regular fortnightly trips throughout the summer and autumn, states that along the south coast of Newfoundland the trend is westward, and that the current sets inwards around Cape Ray. While fishing in summer, Curtis has had his schooner at anchor three or four miles off Cape Ray, and has found the current to be inwards. Anchorage cannot be had much further out, as the depth increases rapidly to 250 fathoms; but the observations and evidence show that this current is distinctly felt for a width of 8 or 10 miles out, and it must often extend considerably further, as it sometimes occupies half the width of Cabot Strait. There can be no doubt, therefore, that this is the usual current on the Newfoundland side of the strait; and that it is this which makes up for the water which leaves the Gulf in the outward current around Cape North, as already explained in former reports on this survey.

This outward current on the west side of Cabot Strait, which sets to the south-east past Cape North, is the most constant in one direction of any at the Gulf entrances, as it is rarely checked under any conditions that occur. But there is evidence to show that the inward current on the Cape Ray side, is not constant at all times. There are instances of sealing schooners in the ice about the month of March, which drifted in the opposite direction past Cape Ray. It appears, however, that while the inward current prevails, the water is usually open and free from drift ice, as it remains open off the south coast of Newfoundland throughout the winter and spring. This in itself is corroborative of the westward set of the current, as the Atlantic water must then be warmer than the Gulf water. The evidence goes to show that when there is ice in the offing of St. George's Bay and off Cape Ray, it comes from the opposite direction, with the general current which makes across the Gulf from Gaspé towards Cape North, and at times when this current or a branch of it, is driven further to the eastward than usual. It is apparently in this way that the outward drift of ice on the Cape Ray side is to be explained, as this undoubtedly occurs in the early spring of some years at least, and when certain winds prevail. The Sailing Directions remark that, in changeable weather, vessels can reach as far north as Lark Harbour, in the Bay of Islands, in any month, as it is only strong westerly winds which bind the ice in on the coast, and it soon clears away.

The ice is thus brought there under conditions which make it an indication of disturbance in the current, as otherwise the water would remain open. This disturbed condition of the current is also accompanied by circling movements in the ice. A schooner in the ice off St. George's Bay has circled around for several days between Cape St. George and Cape Ray without passing either of these capes. When there is ice in this locality, circling movements of a similar kind occur also in Cabot Strait itself, which indicate an inward current in some part of the width of

that strait. There may thus be sufficient inward current to compensate for the outflowing water on the Cape North side, but it is also possible that the outflow from the Gulf may then be partly made up for by an inward flow through the Strait of Belle Isle, which is sometimes considerable in the early spring.

It is not clear what becomes of the current which passes in at Cape Ray. As a rule there is no appreciable current off St. George's Bay, and very little from Cape St. George to the Bay of Islands. We cannot thus trace this inflowing water as an actual current, but it is probable that it makes to the north-eastward, and diffuses itself over the Gulf in that region, because we find that the density of the water throughout the north-eastern portion of the Gulf is the same as in the open Atlantic, and this density could not be so maintained without some inflow of this character.

West coast of Newfoundland.—From the Bay of Islands to Rich Point the current becomes distinct, and runs along the coast to the north-eastward. It is stated by Lieut. Margesson, navigating lieutenant of H.M.S. "Buzzard," which has been stationed on this coast for three years, that the current in the summer season is always in this direction when it is felt at all, and that it usually amounts to one knot. It was stated by Lieut. Betty, navigating lieutenant of H.M.S. "Pelican," who had spent more than one season in cruising here, that there is an almost constant current running north-eastward along this coast between Cape St. Gregory and Rich Point, which is only intercepted by the flood and ebb tides running in and out of the larger bays on the coast. This is the most definite current, and the most constant, in the north-eastern portion of the Gulf, and its characteristics and the unusually steady flow of the under-current have been described from the observations at station G.

The fishermen on this coast anchor their boats as much as 10 or 12 miles off shore, in about 30 fathoms of water. They have thus an excellent opportunity of observing the behaviour of the current. It will be understood, however, that their information refers chiefly if not entirely to the surface current. They state that its prevalent direction is to the E.N.E. parallel with the shore; it will run constantly in that direction for three or four days together; and on the whole it has that direction for rather more than two-thirds of the time. For 12 to 20 hours before the arrival of a south-westerly gale, it sets more strongly in its usual direction; and before a north-easterly gale arrives, it slacks; although this is not so certain an indication of wind, as it may also slack at other times. With long continued easterly winds it may be reversed in direction. It may also set directly off or on-shore for three or four hours or even longer.

The current is stronger near the shore and weaker further out; as it is found that a schooner going westward will make better headway with long tacks; but if going eastward, with short tacks in-shore.

Flat ice, of about six feet in thickness, appears off Bonne Bay about January or February, and remains till March or April. The direction from which this ice comes is variously stated; some holding that it is formed in the Gulf, and others that it comes in through the Strait of Belle Isle; as they say that they can distinguish the gulf ice by its appearance from the northern ice from the strait. Icebergs have also been seen off Bonne Bay large enough to ground in 30 fathoms, but it is very seldom that they come further west on the Newfoundland side than Rich Point.

The ice serves, however, to indicate the usual direction of the current on this coast; as it drifts north-eastward in one day as far as it drifts south-westward in three days, with the same amount of wind one way or the other. A schooner caught in the ice off Cape St. George at the end of March, drifted along the coast as far as St. Barbe in about ten days; a distance of 190 miles; which gives on the average the ordinary rate of about one knot. The ice sometimes makes to the eastward all the way through the Strait of Belle Isle. In March 1896, two schooners caught off Bonne Bay, drifted with the ice eastwards through the strait, and were carried down the Atlantic side of Newfoundland to Notre Dame Bay.

Area at the western end of the Strait of Belle Isle.—Between Rich Point and the entrance of the strait, the current becomes tidal, and does not usually make in

one direction more than the other on the whole. The ice may make a considerable drift when the wind is with the current; but when against it, the ice stands and shoves. The observations obtained here, also show the tidal character of the current in this locality, as already described.

On the opposite shore off the Esquimaux Islands, the fishermen when anchored six miles from shore, find that the current usually runs along the shore in one direction or the other; but there are times when it sets off or on shore for a whole tide. We thus find at the western end of the Strait of Belle Isle an area in which the tidal element predominates; but in which the currents are irregular, and cross-currents are frequent. The area in which these conditions prevail, may be considered to extend from Greenly Island westward as far as a line running magnetic north from Rich Point to the Esquimaux Islands. There is also one of these cross-currents, which sometimes runs from Greenly Island south-eastward; and forms a strong set on shore towards Flower Cove.

Strait of Belle Isle.—The usual character of the current in this strait is tidal, with a flow which is nearly equal in each direction, while the current is undisturbed by heavy or long continued winds. Its behaviour under normal conditions, and when disturbed, has already been fully described in previous reports. (See annual report, Department of Marine, for 1894; pages 95 to 104; and Report of Progress, April, 1896; Plate I). All the information obtained goes to show that the undisturbed condition when the flow is practically equal in each direction with the tide, is the usual one throughout the summer months. This is also confirmed by the report of Mr. M. H. Warren in 1854 to the Newfoundland government, based upon his observation of the current during a season which he spent there; as already quoted in the reports of this survey. (See Report of Progress, April, 1896; page 4).

In the spring and late in the autumn, however, the disturbance is greater; and the flow may be more persistent in one direction or the other. It is usually said that there is much inward flow to the west in the early spring; but if this is inferred from the drift of icebergs, it should be remembered that bergs which are carried in through the strait by the inward flow seldom return; as most of them ground or break up and melt in the Gulf. Hence the inward flow towards the Gulf is made visible, while the outward flow may not be. It is, therefore, necessary to take with caution any statements which may be chiefly based upon the drift of icebergs.

The usual tidal character of the current, and its equal flow in each direction during the summer months is confirmed by Curtis, who has had a long experience in these waters; but in the spring and autumn in his experience, the current although it does turn, runs longer and stronger outwards than inwards; and thus makes outwards on the whole even when the winds are easterly. This is corroborated by Noel from his experience in the ice while sealing in spring; although on the other hand they know that seals on the ice may be carried inwards through the strait into the Gulf, during heavy north-easterly winds.

Such evidence as the above refers necessarily to the set of the surface current; while on the other hand the drift of icebergs shows in which direction the flow takes place on the average of the whole depth; as the bergs are as large as the strait will admit. This explains the difficulty of arriving at just conclusions from the evidence; as we now know that it is the under-current rather than the surface current which indicates the balance of flow in either direction through the strait. If the movements of the icebergs were observed at equal intervals of time, and in relation to the tide, they would give a valuable result; but there are few men who take the care or have the opportunity to do this. It is also likely that in the spring, one year may differ from another with respect to the amount of water which enters or leaves the Gulf through the strait; but a careful consideration of all the evidence obtained corroborates the conclusion which was arrived at by this survey after the first season's work; that the usual tidal flow in the strait does not give more than a small difference in favour of the inward direction towards the Gulf.

In reply to circulars issued by this survey, reports have been received from the captains of trans-Atlantic steamships of the leading lines, which state the direction

of the currents as met with on each trip made through this strait, between Belle Isle and its western end. The result is as follows:—In 1895, from 11th July to 18th October only eight trips were reported. Out of this number, the current set outwards to the east *six times*, with a velocity of 0.25 to 1.50 knots per hour on the average during the whole run through the strait; and *twice* there was no current or it was partly in each direction. In 1896, there are twenty-six trips reported, which were made between 27th June and 30th October. Out of this number the current set outwards *fifteen times* with a velocity of 0.25 to 2.00 knots on the average during the run. It set inwards to the west *five times*, with an average velocity of 0.75 to 1.50 knots; and *six times* there was either no current, or it was part of the time in each direction.

During the season of 1896, the fishermen at the western end of the strait, who have been there all summer, state that the current has run east and west with the tide, as it generally does. These men anchor their boats in 5 to 20 fathoms of water, or if further out, they drift up and down with the tide. They have thus an excellent opportunity of knowing the set of the current; as the strait is there only 12 miles wide. It is not so easy to gather from them in which direction the balance of flow has been the greater; but it appears that on the whole the current has made outwards to the east, rather than inwards, during the past summer. From the beginning of June to the middle of July, the winds were heavy; first, easterly, and later west and north-west. Since then there was a greater amount of south-west wind than usual throughout the summer. All kinds of weather came up with the same wind; and even fog, which is infrequent from that quarter. The winds in the early season did not bring in the ice as they generally do; but on the contrary the strait was clear of ice by 15th May which is earlier than usual. Although there was a great deal of ice at the Atlantic end of the strait throughout the summer, there were fewer bergs than usual which came into the strait itself, and none were seen west of Greenly Island. It is so reported by Captain Macauley of the SS. "Canada," Dominion line, and Captain Johnston, of the Allan line. The icebergs were numerous around Belle Isle, and many passed west of it, and out around Cape Norman; but comparatively few came up the strait west of that cape.

The temperatures of the water in the strait, taken on 1st September, when compared with the temperatures obtained during the season of 1894, show that the temperature of the water towards the surface was above the average. This corresponds most nearly with temperatures found during outward flow; but they are not so high as during the period of persistent outward flow for several days, which occurred five weeks earlier in the season of 1894. (See temperatures as observed on 21st July, 1894). The surface density on 1st September was 1.0239, which is distinctly lower than in 1894, when the average density at eight points in the strait was 1.0243 as observed early in July.

From a consideration of the evidence compared with these indications, it appears that the outward flow of this season was chiefly at the surface, and probably amounted only to a slight difference in favour of that direction; because the observations of 1894 show that the under-current may maintain its tidal character in the two directions, even when the surface current has a dominant set in the one direction, under the influence of the wind. The under-current thus tends to make the flow more nearly equal in each direction than the surface current would indicate. This is nevertheless important to note, while tracing the general circulation.

The North Shore. (Saguenay County, Province of Quebec.)—From the Esquimaux Islands or the offing of St. Augustine, along the north shore to Cape Whittle, all the evidence goes to show that the prevailing movement of the water is westward, if the direction of the under-current is taken into account as well as the surface current. The unusual prevalence of south-westerly winds this season, seems to have had its effect upon the surface current at station E, as well as in the Strait of Belle Isle; but at the three stations on this shore, C, D and E, the under-current made usually to the westward. Where the dominant direction is indicated more clearly by the under-current than by the surface current, the drift of icebergs is a valuable indication. The captains of the steamship lines have seen them as far

west as the Mecattina Islands, and sometimes, though rarely, they reach Cape Whittle. There is good evidence that a small berg was once seen in the early spring as far as Natashquan. From the independent testimony of two fishermen there, this berg was thirty yards square, and as high as the masts of a schooner. It appears to require a combination of favourable circumstances to bring them as far as this, however. The manner in which these bergs make their way westward is thus described by Noel:—An iceberg off St. Augustine drifted in one day on a south-west course to Treble Hill Island, making off-shore; next day it came squarely in towards the land on a north-west course; it afterwards continued on a south-west course, and so worked its way in. It is also stated by Curtis, that within two miles of the shore, where the current runs more strongly in both directions, it still makes to the westward on the whole, and that this applies to the whole shore from St. Augustine to Cape Whittle. It will be noted that the icebergs on this shore are carried to the westward more than twice as far as on the Newfoundland side, where they are rarely found beyond Rich Point.

The master of a schooner who spent the early spring of 1896 in the offing of the Mecattina Islands, states that the current then ran westward continuously during three weeks. The wind at the time was easterly, ranging from E. S. E. to E. N. E. At other times he has also found that this is its usual direction on the whole.

At Great Mecattina Island, which is well off shore, Gaumond states that the current runs in either direction, but is strongest to the westward. In the early spring the ice passes westward at a walking pace, which he estimates at three knots an hour. The channel between this island and the mainland freezes over in winter, and if the ice is more or less packed in it, the island becomes practically a headland, which may thus increase the current. The strength of the current is also indicated by the drift of a schooner which was becalmed on 3rd June last, off Outer Island. From dark at about 20 o'clock till 4 on the following morning, it drifted from there to Little Mecattina Island, a distance of 22 miles in 8 hours or nearly three knots per hour. It is unlikely that the current in the open, ever exceeds this rate of three knots except under special conditions in the Strait of Belle Isle itself. The fishermen not infrequently speak of much higher velocities in these parts; but it is always found on inquiry that these are over-estimated, or that they refer to local rips off points or in confined channels.

A measure of the velocity of the surface current in the eastward direction or contrary to its usual set, was obtained at the end of July, 1894, at three stations lying between Rich Point and the Esquimaux Islands. These stations were occupied immediately after prolonged westerly winds; and it was stated in the report for that year, that the velocities then found were probably as great as ever occur in this eastward direction, owing to the special conditions at the time. The velocity amounted to 0·79 of a knot per hour at the middle, and 1·19 to 1·37 knots on the two sides. The layer of water in motion had a thickness of only 5 to 10 fathoms. (See conditions as described in annual report, Department of Marine, for 1894; pages 103 and 104.)

Reports have been received from the captains of trans-Atlantic steamships, in reply to the circulars, in which the Gulf was divided into several regions. On the run between Heath Point and Greenly Island, the current which was met with on each trip is described, with the following result:—In 1895, from 11th July to 18th October, only eight trips were reported. Of this number, there were *six times* when there was no current appreciable; and *twice* the current set to the westward with a velocity of half a knot. In 1896 there are twenty-four trips reported, which were made between 5th July and 30th October. *Ten times* there was no current appreciable; *nine times* the current set eastward with a velocity which ranged from 0·20 to 0·75 of a knot per hour on the average during the above run; *five times* the current set westward, with a velocity which ranged from 0·30 to 0·75 of a knot on the average.

It is clear that in dealing with such currents as these, a distinction must be made between the set of the surface water and the direction in which the general circulation takes place. There can be little doubt that when both surface and

under-current are taken into account, the movement of the water as a whole is to the westward on the north shore from the Esquimaux Islands to Cape Whittle.

The surface current will also have this direction when undisturbed, or during easterly winds; but its actual set is very irregular and may be in almost any direction. On comparing the observations obtained at stations C, D and E, with the other evidence, it is found that these observations may be taken as a good illustration of the ordinary behaviour of the current, as now stated; and they show that even when the surface current sets in other directions, the under-current still makes usually to the westward.

It is more than probable that the water which makes westward along the north shore is a return current corresponding with the north-eastward set on the Newfoundland side. There is no other direction from which this water can come; as any inflow that there may be through the Strait of Belle Isle is quite insufficient to keep up the supply. A large volume must make to the westward if this is in reality the usual direction of the under-current from about 15 fathoms downwards, where the total depth is seldom less than 40 fathoms.

The water must make across from the Newfoundland side to the north shore in the area already referred to, lying between Rich Point and the west end of the Strait of Belle Isle. On the western confines of this area, there is a constant current setting in from the south-west, and another setting out to the westward, while on its eastern side there is the strong ebb and flow of the strait itself. There may also be times when long continued winds give the surface current a drift which is either eastward or westward according to its own direction. As the depth ranges from 30 to 70 fathoms, it is sufficient to allow the water to make across to the northern side as an under-current, as it is quite possible that it does. The irregular character of the currents in this area is thus accounted for.

On the west coast of Newfoundland, the surface current and the under-current have the same direction; but in the return current on the north shore the direction is maintained chiefly by the under-current, while the current on the surface is not infrequently to the eastward. The reason of this must be, that in these latitudes the prevailing winds are westerly; and they are with the one current, and against the other; and thus reverse its surface drift.

Although the current on the Newfoundland side is thus the more distinct, the north shore current is the better known, as it lies more directly on the route of the Atlantic steamships; and that coast is also more frequented by fishermen. The icebergs carried westward by it may also have been taken as a corroboration of the old belief in the dominant inward direction of the current in the Strait of Belle Isle; but the examination now made, points to a quite a different explanation as we have seen.

Cape Whittle to Heath Point, and the Channel north of Anticosti.—From the observations of 1895, in the Mingan Strait, it appears that the current is there tidal, with a flow which is practically equal in each direction. (See Report of Progress, April, 1896, pages 17 and 18). There is, therefore, no through current to be expected in the channel north of Anticosti.

At Natashquan Point, which is half way between Cape Whittle and the Mingan Islands, the observations during the summer with the flag buoys show that the surface current makes out to the south-eastward more than inwards. The observations show this outward flow to be even more marked at East Cape, where the set is southward for two-thirds of the time. It is also stated by men who know Anticosti, that it is only on the short length of coast, from Table Head to East Cape, where the shore runs north and south, that the current has a dominant set of this character.

At station A the dominant direction of the surface current was found to be the same as the direction of the winds which had the greatest mileage at the time. As winds from the westerly quarter are the most prevalent at any time, it is probable that the surface current usually has this outward tendency. This is confirmed by the experience of Captain Macauley of the SS. "Canada," who states that in crossing from Heath Point to Cape Whittle, vessels are set more to the southward by north-west winds, than to the northward by south-east winds.

As there is no evidence of any through current in this channel, the outward tendency of the surface water must originate in the channel itself; and it appears to be balanced by an inward tendency in the under-current. The two series of observations obtained at station C, show that the current which sets to the westward along the north shore, on reaching Cape Whittle makes on the whole to the north-westward. This dominant direction is more marked in the under-current than on the surface; and this inward trend of the current around Cape Whittle is to be looked upon as an indraught to make up for the outflow on the surface.

These dominant directions of the current when taken together, point to the conclusion that the water on the whole makes across from Cape Whittle towards East Cape. It probably does so chiefly as an under-current; because the prevailing westerly winds influence the surface water in their own direction. But as the southward set is stronger on the Anticosti side, the surface water appears to be carried over against that side by the westward direction of the water off Cape Whittle; which shows that its influence is felt all the way across.

Off the east end of Anticosti, the water makes on the whole to the westward, as we have seen from the under-current observations at stations B and H. It is more than probable that this water continues westward, and contributes to the return flow which compensates for the Gaspé Current. The temperature and density of this water do not furnish any positive indication to show where it comes from; and although it may possibly be drawn from the central part of the Gulf, where the water coming in at Cape Ray diffuses itself, it appears more likely that it is water which has made its way across from Cape Whittle.

GENERAL CIRCULATION IN THE GULF.

Although there are few instances of currents in this region which run steadily enough to be termed constant, we have yet found it possible from continuous observation or long experience to arrive at a dominant direction for each locality; or the direction in which the current runs more frequently, and in which, therefore, the water makes on the whole. In reviewing these movements of the water, with a view to tracing the general circulation in the Gulf, it is the principle of the balance of flow which is the most evident. Wherever a current of a constant character occurs, there is a corresponding return current to make up for it. Thus in Cabot Strait, the outflowing water at Cape North is balanced by the inflow at Cape Ray; the north-eastward current on the west coast of Newfoundland is balanced by the contrary direction of the movement on the opposite shore; and we have fairly good indications of a return flow to compensate for the Gaspé Current.

It is this balance of flow which points to the nature and direction of the circulation of water in the Gulf. If we begin to trace it from Cabot Strait, where the balance between the Gulf and the Ocean takes place, the inflow at Cape Ray appears to diffuse itself more or less widely over the central part of the Gulf, but it regains its strength on the west coast of Newfoundland, and makes a deep bend into the north-eastern angle of the Gulf, and returns westward, as we have seen, along the north shore. On reaching Cape Whittle, it still makes westward; and, whether as an actual set, or by displacing water which comes more directly from Cape Ray, it appears to work around the eastern end of Anticosti, and so compensates for the outflow of the Gaspé Current from the estuary of the St. Lawrence. This current, after rounding the Gaspé coast, makes south-eastward as a general set or drift across the Gulf to the western side of Cabot Strait; and its waters there leave the Gulf in the outflowing current off Cape North. This current is still felt along the sweep of the north-eastern coast of Cape Breton Island, sometimes as far as Scatari, before it mingles with the waters of the Atlantic.

This general movement of the water in the Gulf is in accord with the uniform and relatively high density of the water in its north-eastern portion, already referred to; and explains why this density should be so nearly the same as in the open Atlantic; and also why there should be so small an increase in the temperature of the surface water with the progress of the season.

This must, therefore, be the usual course of the water, more especially in the summer season when the currents are least disturbed. But if at times in the spring, the outflowing water in Cabot Strait occupies the greater part of the width of that strait, the amount of water required for compensation may then flow into the Gulf through the Strait of Belle Isle. Although it is quite possible that this may occur in the early spring of some seasons, the evidence does not point strongly in that direction. On the other hand, it is now more evident than ever, that there cannot be any through current across the Gulf from Belle Isle to Cabot Strait according to the old theory; as we now see that any inflow at Belle Isle would be turned along the north shore, rather than in that direction.

It also appears that the whole of the balance or compensation in the Gulf currents takes place at the surface and in ordinary under-currents, which do not probably extend to a greater depth than some 50 or 60 fathoms. There is nothing, therefore, to show the necessity for any appreciable movement in the deep water from 60 or 80 fathoms downward, which lies in the deep channels of the Gulf. Such direct indications as have been obtained favour the belief that this deep water is quiescent.

How far the prevailing westerly winds may influence these general movements of the water, it is difficult to say. The prevailing winds over the Gulf generally, are north-westerly in winter and south-westerly in summer. These winds may have an appreciable influence in maintaining the current on the western side of Newfoundland and in carrying it further into the north-eastern angle of the Gulf before it returns. If this effect is attributed to the wind however, it makes it all the more difficult to understand why it is that the water of lower density in making its way from Gaspé to Cape North is not carried further over into the Gulf, but keeps to the south west, or the windward side. This feature has already been remarked upon in a previous report; and, although a satisfactory explanation is not yet apparent, it may be well to point out that the bias of the current in both cases accords with the rotation of the earth. Thus the Gaspé Current, after rounding the Gaspé coast, tends to the west, as its course is southward; and the inflowing water at Cape Ray, with a northward direction, tends to the east. As the Gulf of St. Lawrence lies between 46° and 52° north latitude, it is possible that the rotation of the earth may have an appreciable effect.

It is probable that the temperature and density of the water and the direction of its currents, may have important bearings upon the movements of fish, which as yet are imperfectly understood. This opinion is held by the countries bordering on the North Sea; and the information afforded by the investigation of the movements and other characteristics of the water are there used as a basis in arriving at the reasons for the distribution and migration of fish at different seasons. This information has its chief application in the North Sea to the herring fishery; and yet a practical return is expected for the outlay which is made in obtaining it; and the investigation is of such importance that arrangements are being discussed for international co-operation amongst the countries bordering on the North Sea in carrying it on. In our fisheries, the cod and mackerel have a greater importance relatively than the herring; which would warrant the expenditure of larger sums in proportion in promoting their interests by such investigations.

As an example of the importance of knowing where fish are to be found, and why they prefer one region to another in different seasons, it may be mentioned that during last season fishing schooners were returning from Labrador in September with half cargoes, while within the Gulf we found on the "Lansdowne" that cod were everywhere abundant throughout the summer on the 30 and 40-fathom banks, which no schooners were taking advantage of. It is held by fishermen that fish are never caught while the water is clear; and its clearness must have some relation to physical conditions which could be ascertained. It is also known that the cod are caught in shallower water in the spring, and further from shore as the season advances. This may depend more directly on the movements of the herring or capelin which they follow; but these fish may themselves be influenced in their movements by the temperature or other characteristics of the water which may differ at different times.

Summary note regarding the set of the surface current in the north-eastern portion of the Gulf of St. Lawrence.—From the character of the currents as described, and the great variation in direction which they show, especially at the surface, it is necessarily difficult to lay down rules with regard to the current as it affects shipping, which will not be subject to a large amount of exception. It is of practical importance to note that the currents throughout this region are all slow, and seldom exceed one knot per hour in the summer season. It is no doubt on this account that they are so liable to disturbance, and present so much irregularity when examined in detail.

It has been possible as we have seen, when longer periods are considered, and when the under-current also is taken into account, to trace the general circulation of the water; which depends upon a greater movement in some dominant direction rather than in other directions, when long averages are taken. A knowledge of this general circulation is important to mariners, as it includes all the more constant currents, and it also shows the direction which the surface current tends to take when undisturbed.

The primary tendency in the surface current is thus to follow the direction which the general circulation has in the locality in question; but this tendency is disturbed and often overcome by the influence of the tide and the wind. The tidal influence shows itself chiefly as a veer in the direction of the current, which is either through a limited range, or completely around the compass; and it is also probable that the tides themselves are irregular in this region, owing to the interference of the tidal undulation from the Strait of Belle Isle with the main tide which enters through Cabot Strait. When the wind remains in one quarter and has any considerable strength, the drift which it gives to the surface water soon extends to a depth of five fathoms or more, and its influence thus makes itself felt throughout the thickness of the surface layer which affects shipping. As a rule these influences are all acting at the same time; and it is their combined effect which gives rise to the actual behaviour of the surface current.

It may, therefore, be of advantage to give in brief the actual behaviour of the surface current, in the various parts of the region under consideration; without distinguishing more than may be necessary, between the causes which influence its movements. It is to be understood that the currents referred to are in the offing, and do not include local currents close in shore.

On the west coast of Newfoundland, the current almost always sets along shore to the north-east. It is scarcely appreciable from Cape St. George to the Bay of Islands; but from there to Rich Point it is distinct and usually amounts to one knot per hour. Occasionally, the set may be off or on shore for a few hours at a time. It is also possible for the current to slack, or to be reversed on the surface, during heavy north-easterly winds.

From Rich Point to the western end of the Strait of Belle Isle, the currents are variable and uncertain in their direction, and cross-currents are frequent. The reasons for this have already been explained. The area in which such currents may occur, extends westward from the narrowest part of the strait at Amour Point to a line through Rich Point running magnetic north to the Esquimaux Islands. Towards the western side of this area, the currents are usually less than one knot, and seldom exceed one and a half knots; but towards the entrance of the strait their strength increases, while in direction they are more nearly in the line of the strait itself.

The characteristics of the current in the Strait of Belle Isle itself have been already fully described. (See reports already quoted; and also Notice to Mariners, No. 65 of 1895, Department of Marine and Fisheries, Ottawa).

On the steamship route running through this region from Greenly Island to Heath Point, the surface current has in general the following characteristics in the summer season, as ascertained by observations in the months of July, August and September, 1896:—From the offing of the Esquimaux Islands to the east end of Anticosti, the strength of the current usually ranges from half a knot to one knot per hour. In direction, the current veers continually, and it usually makes complete

revolutions around the compass in a right-handed direction. In ordinary weather, the manner in which this veering of the current takes place is such that the direction of the current is out of relation with the time of the tide. (From continuous observations of both surface and under-currents, some tidal relations have been made out, which hold good for the surface current during periods of calm weather). With regard to the influence of the wind, when a period of several days or a week is taken as a whole, it is found that the greatest amount of set has taken place in the same general direction as the greatest total mileage of wind; but at any particular time, the direction of the current is seldom the same as the wind which is blowing locally.

On the different parts of this route, it may also be noted that along the North Shore from the offing of the Esquimaux Islands to Cape Whittle, the direction of the current is more usually along the shore, than either off or on shore. Also, judging from the general movement of the water as indicated by the under-current, it is probable that on the surface the current sets more strongly to the westward during east winds, than eastward during west winds. (In the early spring, it is said to attain a speed of three knots when setting westward). In the more open waters from Cape Whittle to Heath Point, the observations make it probable that the current sets more frequently to the south-eastward than in other directions, under the influence of the prevailing winds. Also, in the offing of Cape Whittle during periods of calm weather, the current makes to the north-westward more than in other directions; and in its movement, a tidal element can be recognized. In the offing of Heath Point, the current as it veers around, sets off or on shore for about two hours at a time.

Present position of this branch of the Tidal Survey, and future work.—During the past three seasons, a general examination of the currents in the interior of the Gulf of St. Lawrence and the straits connecting it with the Ocean, has been made with special reference to the leading steamship routes which pass through it. Little attention has yet been given to the currents in the wide bay formed by the sweep of the coast from Miscou to Cape Breton, in which Prince Edward Island lies. The strong tidal currents of the Lower St. Lawrence have not yet been examined; as they are usually parallel with the shore and have less tendency to set a vessel out of its course; and also because from Father Point to Quebec, vessels have the advantage of the Pilot service. It was also necessary to obtain first some knowledge of the Gulf currents and their relation to the Ocean. No detailed examination has yet been made of the currents in the Atlantic, off the outer end of the Strait of Belle Isle, for the assistance of vessels in making the strait. On the south coast of Newfoundland, it is reported that there is a strong indraught into the larger bays; and to this several wrecks are attributed. The distance from shore that this is felt, and the conditions of wind and tide which give it the greatest strength, should be ascertained; as two of our leading steamship routes follow this coast. Some information has been collected with regard to the general set of the current on the Atlantic coast of Nova Scotia; but the currents on the south-western coast and in the Bay of Fundy are much more important. In the upper arms of the bay, the currents are probably parallel with the coast line, as in the Lower St. Lawrence; but there, the navigation is entirely dependent on the tide, and the time and height of the tide are of the first importance. Towards the mouth of the bay, the currents require investigation in the interest of the steamship lines running to St. John, and to ports in western Nova Scotia. An examination of these should be made while the principal tidal stations are still in operation; as they are chiefly tidal, and their behaviour can only be ascertained by direct comparison with a tidal record. This may serve to indicate the information which is most needed with regard to the currents on our eastern coasts, and which it is important to obtain as soon as possible in the interest of Canadian shipping.

I have, sir, the honour to remain,

Your obedient servant,

W. BELL DAWSON,

In charge of Tidal Survey.

TABLE I.—DIRECTION OF THE SURFACE CURRENT; showing the time of flow in each towards the directions indicated. The directions

NOTE.—After August 12th the directions of the current, during the day time, are the mean

Locality.	1896.	Total time in hours.	S.	S.S.W.	S.W.	W.S.W.	W.
<i>Station A.</i>							
Midway between East Cape, Anticosti, and Cape Whittle.	Wednesday, July 8..	3½					
	Thursday do 9..	24	4	1		1	3
	Friday do 10..	24	2	2	2	1	
	Saturday do 11..	24	2	2	10	4	8
	July 12 13..	24	9	7	1	6	5
	Tuesday, July 14..	24	2	1	6	2	2
	Wednesday do 15..	6½	3	2	3	1	
	Totals	130	22	15	22	15	18
<i>Station B.</i>							
At 24 miles S.E. of Heath Point, Anticosti.	July 15-16	7½					
	Friday July 17..	3½					
	Saturday do 18..	24	6	2	2	2	
	Monday do 20..	24					
	Tuesday do 21..	24	3			1	
	Wednesday do 22..	24	1	1		1	6
	Thursday do 23..	7½					
	Totals	114½	10	3	2	4	6
<i>Station C.</i>							
At 18 miles S. of Cape Whittle	Monday, July 27..	11	2		1		
	Tuesday do 28..	24	3	1	1		1
	Wednesday do 29..	24	1	4		4	3
	Thursday do 30..	24					
	Friday do 31..	6½					
	Wednesday, Aug. 12..	15			1	3	7
	Thursday do 13..	24	2	4	6	10	
	Friday do 14..	24		2	1	3	12
	Saturday do 15..	24	3	4	4	7	1
	Totals	176½	11	15	14	27	24
<i>Station D.</i>							
At 15 miles S. by W. of Great Mecattina Island.	Wednesday, Aug. 19.	15	8	2	3	2	3
	Thursday do 20..	24	1	6	2	3	
	Friday do 21..	24	6	8	4	2	2
	Saturday do 22..	16	9	5	5	2	
	Totals	79	24	21	14	9	5
<i>Station E.</i>							
At 13 miles S.S.E. of Shecatica Bay.	Monday, Aug. 24..	2					
	Wednesday do 26..	13½	2				
	Thursday do 27..	14½	2			1	
	Totals	30	4			1	
<i>Station F.</i>							
At 10 miles N.N.W. of Rich Point.	Thursday, Aug. 27..	6	1				
	Friday do 28..	24	3				
	Saturday do 29..	8					
	Totals	38	4				

direction. The figures give the number of half-hours during which the current set are magnetic. Variation, 29° to 34° W.

between the directions at the surface and at a depth of 18 feet. Compare Plates II. and III.

W.N.W.	N.W.	N.N.W.	N.	N.N.E.	N.E.	E.N.E.	E.	E.S.E.	S.E.	S.S.E.	S.	No current.
2 1 1	2 3 2	1 2 1 1	2 1 1 2	4 3 1 1	5 3 1 1	3 3 3 1	1 8 3 1 3	1 5 9 3 5 10	2 2 1 1 7 10 1	4 2 2 4 5 3	4 2 2 9 2 3	12 6 5 2
4	7	6	6	8	10	9	16	33	24	20	22	25
4	...	1 7	2 2 1	4 3 2	6 3 8 1	2 2 12 4 5	1 2 17 6 1	7 6 5 2 7	1 4 3 6 6	3 3 3 1	6 3 3 1	1 3 8 10
7	1	10	6	15	23	38	34	27	14	7	10	22
1 2 3	1	2 3	3 3 1 4	3 3 4 4	1 8 4 8 1	2 8 4 15 1	2 5 3 3	1 3 4 6	4 3 2 11	5 4 5 4	2 3 1	2
5 4 13 4	2 1 14 5	4 9 8	2 5 6	1 4 4	1	...	...	...	1	...	2 3	5 1 3 1
32	23	26	27	19	26	30	13	14	21	19	11	12
...	3	...	...	1	2	5	7	7 1 4	...	7 4 16 5	8 1 6 9	5 7 5
...	3	...	...	1	2	5	7	12	6	32	24	17
...	2	...	...	2	1 2	3 1	1 9	10 5	1	8 2	2 2	8
...	2	...	...	2	3	4	10	15	1	10	4	8
...	8 5	5 1	1	9	1	2 4	6 3	8 2	2	2 1 1	1 3	1 3 7
...	13	6	1	9	1	6	9	10	2	4	4	11

TABLE I.—Direction of the Surface Current, showing the

Locality.	1896.	Total time in hours.	S.	S.S.W.	S.W.	W.S.W.	W.
<i>Station G.</i>							
At 12 miles W.N.W. of Cow Head, (on the west coast of Newfoundland).	Thursday, Sept. 3.	2					
	Tuesday do 8.	13					
	Wednesday do 9.	24					
	Thursday do 10.	22½					
	Friday do 11.	4					
	Monday do 14.	6½					
	Totals.....	72					
<i>Station H.</i>							
At 13 miles S.E. of Heath Point, Anticosti.	Wednesday, Sept. 16.	2½	2	2			
	Thursday do 17.	16½	4				2
	Monday do 21.	8	2	2	2		
	Tuesday do 22.	5					1
	Thursday do 24.	15½	3	8	2		
	Friday do 25.	15½		1	1	6	3
	Saturday do 26.	3					
	Totals.....	66	11	13	5	6	6

time of flow in each direction, &c.—*Continued.*

W.N.W.	N.W.	N.N.W.	N.	N.N.E.	N.E.	E.N.E.	E.	E.S.E.	S.E.	S.S.E.	S.	No current.
		3	1			6						1
		4	9	6		33	3					1
		9	1	2	10	27	6					
								7	1			
		3	3	2	1	1						3
		19	14	10	12	67	9	7	1			5
			1	2	6	5	2	2	1		2	
						2		3	4	1	4	4
									2	3	2	
6	3			4	2			3	1	3	3	3
2					1	8	1		1	1		
6	2					1			1			3
	1											
14	6		1	6	9	16	3	8	10	8	11	10

TABLE II.—UNDER-CURRENTS; THEIR VELOCITY AND DIRECTION.

The positions of the stations are shown on the chart, Plate I. The time of the observations is Standard time for the 60th meridian, reckoned on the 24 hour system from midnight to midnight. The figures in the columns show the velocity of the current in knots per hour; and the directions are those towards which the current sets. These directions are magnetic. Variation, 29° to 34° W.

These results were obtained by means of an attached surface float, a current meter at three fathoms, and a deep fan supported by sounding wire; in accordance with the methods explained in the body of the report. The results as given are reliable. When the under-current was so slow that its bearing was uncertain, its general direction only is given. The velocity is correct to the nearest tenth of a knot; and if uncertain, it is omitted.

STATION B.—OFF HEATH POINT, ANTICOSTI. DEPTH, 52 FATHOMS.

Depth.	Saturday, 18th July, 1896.							20th July.	
	10.30	13.10	14.00	15.30	16.30	17.40	18.40	9.30	10.30
Surface....	0.5 E l S	0.9 SE	0.8 SE	0.8 SE	0.8 S l E	0.9 S l W	1.1 SW	0.2 E l S	0.3 SE
3 fathoms..	0.4 E l S	0.9 SE	0.8 SE	.....	0.8 S l E	0.9 SW	0.9 WSW	None.	0.3 S l y
10 do ..	None.	0.4 E	0.7 E	.....	None.	0.3 SW	0.6 W l S	None.	Slack
20 do ..	None.	0.4 E	0.4 E	0.5 NE	0.4 NNE	None.	0.5 W l y	0.6 W l S	0.3 W l N
30 do ..	.....	0.5 E	0.5 N	0.3 NE	0.6 NNE	None.	0.6 W l y	0.4 W l S	.....
40 do ..	.....	.....	0.5 N	.....	0.8 N l W	0.4 ENE	0.6 W l y	0.4 W l S	.....

Depth.	Monday, 20th July—Continued.					Tuesday, 21st July.			
	11.30	12.10	13.50	16.15	19.15	10.15	10.50	11.30	14.20
Surface....	SE l E	SE l E	0.6 ESE	0.6 E l S	0.5 ESE	None.	None.	0.5 WSW	0.5 ENE
3 fathoms..	0.3 SE	0.4 SE	0.5 SE	0.5 ESE	0.3 NNE	0.6 SW	0.7 W	Undercur- rent comes up to surface.	0.5 ENE
10 do ..	None.	0.4 SE	0.5 NE	0.4 ENE	0.4 NNE	1.0 W l N	0.8 W	.....	0.6 NE
20 do ..	0.3 NW	None.	0.5 NNE	0.6 ENE	0.5 NE	0.7 W l N	0.6 W	.....	0.3 E
30 do ..	0.4 WNW	.....	None.	0.5 ENE	0.3 NE	0.5 WSW	0.7 W	.....	None.
40 do ..	0.4 WNW	0.2 NW	None.	0.5 NNE	0.4 NE	0.5 WSW	0.7 WSW	.....	.....

Depth.	Tuesday—Con'd.		Wednesday, 22nd July, 1896.						
	16.00	17.00	9.45	10.40	11.10	13.50	16.10	17.50	18.45
Surface....	0.8 NE	0.9 NE	0.1 W l y	0.1 W l y	None.	0.3 NE	0.3 ESE	0.3 ESE	0.4 SE
3 fathoms..	0.8 ENE	0.9 NE	0.5 NW	0.5 W	0.6 WNW	0.6 —	0.7 E	.....	None.
10 do ..	0.7 ENE	0.5 NE	0.5 WSW	0.5 W	0.7 W	0.3 W l y	0.8 NE	.....	0.5 E
20 do ..	0.5 NE	0.6 NE	0.2 W l y	0.4 W	0.5 W	0.9 NW	0.6 NNE	.....	0.6 NNE
30 do ..	0.5 NE	0.7 NE	0.2 W l y	.....	0.4 W	0.8 NW	0.6 NNE	.....	0.6 NE
40 do ..	0.7 NE	0.7 NE	None.	.....	0.4 W	0.7 WNW	.....	0.9 N	0.8 NNE

TABLE II.—Under-currents—Continued.

STATION H.—OFF HEATH POINT, ANTICOSTI. DEPTH, 37 FATHOMS.

		Thursday, 17th Sept., 1896.				Monday, 21st Sept.				
Depth.		9.05	10.20	14.00	16.10	Weather very rough. Observations approximate.	9.15	9.55	10.55	11.50
Surface.....		0.5 SE	0.6 S b W	Slack.	0.5 N b E		1.1 E b N	0.9 E b N	0.9 ESE	1.0 SSE
3 fathoms..		0.5 SSE	0.6 S b W	0.4 S b W	0.6 N		1.1 E b N	0.9 ESE	0.9 SE	1.0 SSE
5 do ..		0.7 S	0.6 SSW		Slack.		1.1 E b N		1.0 SSE	1.0 S
10 do ..		0.3 SW	0.3 SW	0.5 WNW	None.		0.9 E b N	1.0 ESE	0.8 SE	0.9 S
20 do ..		0.3 SSW	0.3 SW	None.	Slack.		0.8 E b N	0.6 ESE	0.4 ESE	0.3 S'ly.
30 do ..		None.	0.3 SSW				0.5 E b N	0.5 E	None.	None.
		Monday—Continued.			Tuesday, 22nd Sept.					
Depth.		13.25	14.50	15.40	10.10	11.10	13.00	14.10	Heavy weather continuing Wednesday. Wind E to NNE. 1157 miles in 36 hours.	
Surface.....		1.1 S	1.2 S b W	— SW	0.7 NNW	0.7 WNW	0.7 WNW	0.7 W		
3 fathoms..		1.1 SSW	1.2 —	(Rolling heavily.)	0.7 NNW	0.7 NW	0.6 NW	0.7 W b S		
5 do ..					0.5 N b W	0.6 NW	— NNW			
10 do ..		0.9 SSW	0.9 S b W	0.9 SW	0.6 N	0.5 NNW	0.5 W	0.9 W'ly		
20 do ..		0.4 S	0.5 S b W	0.5 SW	0.3 N'ly	NW'ly	1.0 WSW	1.0 WSW		
30 do ..		0.3 S	0.5 S b W	0.4 SW	None.	NW'ly				
		Thursday, 24th Sept., 1896.								
Depth.		9.05	10.00	11.15	11.45	13.35	14.55	16.20	16.55	17.45
Surface.....		1.1 NNE	0.9 NNE	0.8 E	0.7 ESE	0.9 SSE	1.3 S b E	1.3 SSW	1.3 SSW	1.0 SW
3 fathoms..		1.1 NNE	1.0 NE	0.8 E	0.5 ESE	0.9 S b E	1.3 S b W	1.2 SSW	1.2 SSW	1.0 SW
5 do ..		1.1 NE	0.9 NE	0.7 NE	0.5 E b S	0.7 S	1.1 —		1.2 SW	0.9 WSW
10 do ..		1.0 NE	0.6 NE	0.3 NNE	0.3 SSE	0.5 S b W	0.8 SW		1.0 WSW	0.8 SW
20 do ..		0.7 ENE	0.4 ENE	0.4 N	None.	0.5 W	0.8 WSW	0.5 WSW	0.5 WSW	0.3 SSW
30 do ..		0.7 E	0.4 ENE	0.4 N	None.	0.5 WSW	0.7 SW	0.5 SW		0.6 SE
		Friday, 25th Sept., 1896.								
Depth.		8.55	9.40	11.00	11.55	13.20	14.50	17.10	18.35	
Surface.....		0.7 WNW	0.7 WNW	0.6 NW	0.6 WNW	0.7 W b S	0.7 WSW	0.5 WSW	0.5 ESE	
3 fathoms..		0.7 WNW	0.8 NW	0.5 WNW	0.6 WNW	0.7 W b N	0.6 W b S	0.4 WSW	0.4 SE	
5 do ..			0.8 NW	0.6 NW	0.6 WNW	0.7 W b N	0.6 W b N	0.5 W b S	0.5 SSE	
10 do ..		0.4 NNE	0.4 NNW	None.	0.6 WNW	0.6 W	0.8 WSW	0.7 W b S	None.	
20 do ..		0.7 NNE	0.6 N b E	0.4 N'ly	None.	0.4 W	0.8 WSW	0.8 W b S	0.4 SSW	
30 do ..		0.6 NNW	0.6 NNW	0.4 NNW	None.	0.5 WNW	0.6 W	0.8 W	0.5 SSW	

TABLE II.—Under-currents—*Continued.*

STATION C.—OFF CAPE WHITTLE. DEPTH, 71 FATHOMS.

Monday, 27th July, 1896.									
Depth.	14.15	14.30	15.10	15.35	16.05	16.35	17.05	17.35	19.05
Surface.....	1.0 E b N	1.1 E b S	1.1 ESE	1.0 ESE	0.9 SE	1.0 SE	1.0 SE	SE b S	1.1 SSE
3 fathoms..	1.0 SE	1.1 SE	1.1 SE	1.0 SE	1.0 SE	1.0 SE	1.0 SE	1.0 SE	1.1 SSE
10 do	None.	None.	None.	0.5 ESE	None.	None.	0.3 E	0.3 E	0.3 SSE
20 do	0.6 NW	None.	None.	0.3 W	0.3 W	None.	None.	None.	0.3 SE
30 do	0.5 NW	0.5 W	None.	0.4 Wly	None.	0.3 W	None.	0.4 E	0.3 ESE
40 do	0.5 NW	.....	.....	.....	.....	.....	.....	.....	.....
50 do	0.6 NW	.....	.....	0.5 NW	.....	None.	.....	.....	.....
Tuesday, 28th July, 1896.									
Depth.	9.10	9.35	10.15	10.40	11.05	11.55	13.10	13.45	15.15
Surface.....	0.8 SSE	0.8 S b E	0.7 S	0.7 S	0.8 S b W	1.0 S b W	Veering	0.8 WNW	0.8 NW
10 fathoms..	0.5 SE	0.3 S	0.2 S	0.2 S	0.3 S	0.4 S	None.	None.	None.
20 do	0.5 NNE	None.	None.	None.	None.	0.5 SSE	None.	None.	.....
30 do	0.5 ENE	0.4 E	None.	None.	None.	0.4 S	None.	.....	.....
50 do	0.5 NNE	.....	.....	0.5 NE	.....	.....	.....	.....	.....
Tuesday—(Continued).					Wednesday, 29th July, 1896.				
Depth.	16.15	16.45	17.20	17.45	9.10	10.15	10.45	11.40	13.20
Surface.....	0.8 N b W	0.8 N	0.7 NNE	0.7 NE	0.9 NE	1.0 ENE	1.0 ENE	0.9 E b N	0.8 E b S
3 fathoms..	.....	.....	.....	.....	.....	.....	.....	0.9 ENE	0.9 ESE
5 do	.....	.....	.....	.....	0.8 NE	.....	.....	0.7 ENE	0.5 ESE
10 do	0.6 NW	None.	None.	0.5 E	0.4 NE	0.4 E	0.4 ENE	0.3 ENE	0.3 NNW
20 do	.....	None.	.....	None.	None.	0.3 E	0.3 ENE	0.3 ENE	0.4 NNW
30 do	0.3 N	0.3 N	.....	None.	None.	0.3 E	0.2 ENE	0.3 ENE	None.
50 do	0.5 W	0.6 W	.....	None.	None.	None.	0.3 ENE	.....	.....
Wednesday—(Continued).					Thursday, 30th July, 1896.				
Depth.	14.40	15.10	16.15	17.30	19.00	9.45	17.20	17.45	19.05
Surface.....	0.5 ESE	0.5 SE	0.7 SE	0.6 SSW	0.5 SSW	* SE	* E b N	* E b N	* E b S
3 fathoms..	0.5 SE	0.5 SE	.....	.....	.....	.....	Uncert.	0.6 SE	.....
5 do	0.4 SE	0.4 SE	.....	.....	.....	.....	0.3 NE	0.3 E	0.6 SE
10 do	0.3 NW	0.2 NNW	None.	None.	.....	Slack.	None.	None.	None.
20 do	0.4 NW	0.5 NNW	0.3 NW	0.3 NW	None.	Slack.	.....	None.	None.
30 do	0.4 NW	0.5 NNW	0.3 WNW	0.3 NW	.....	Slack.	.....	.....	.....
50 do	.....	.....	None.	.....	.....	.....	* Rough	weather.	.....

TABLE II.—Under-currents—Continued.
STATION C.—Concluded.

Depth.	Wednesday, 12th Aug., 1896.						Thursday, 13th Aug.		
	10.30	11.40	13.15	15.40	17.15	19.30	9.45	10.50	11.45
Surface.....	0.2 WSW	0.4 WNW	0.4 NW	None.	None.	None.	0.3 NW	0.4 NNW	0.5 NNW
3 fathoms...	Slack.	0.2 WNW	0.4 —	0.4 Wly.	0.4 WSW	0.4 W	0.3 NW	0.4 NW	0.5 N b W
5 do	Slack.	Slack.	None.	0.5 W	0.3 SSW	None.	None.	.....	0.4 N
10 do	None.	None.	None.	0.4 W	None.	0.4 SW	None.	.....	0.3 N
20 do	None.	None.	None.	None.	None.	—Wly	None.	0.3 NNE	0.3 NNE
30 do	None.	0.2 S	None.	0.3 WSW	0.2 SW	0.3 S	0.3 E	0.2 NNE	.....
50 do	None.	None.	.....	0.5 W	0.2 SW	None.	0.5 E	0.3 ENE	.....

Depth.	Thursday—Continued.					Friday, 14th Aug.			
	14.30	15.45	17.00	19.05	(Current to the south- ward begins at the surface and gradually becomes deeper).	9.40	10.15	11.40	13.00
Surface.....	0.4 N	0.5 N b E	Slack.	0.6 S b W		0.3 NW	0.4 NNW	NW b N	0.5 NW
3 fathoms...	0.4 N b W	0.5 N	None.	0.5 SSW		None.	0.4 NNW	0.5 NW	0.5 NW
5 do	0.4 N	0.3 W	Slack.	0.4 SW		None.	0.3 NNW	0.3 NW	0.3 NW
10 do	0.3 N	0.3 W	Slack.	—Wly.		0.4 W	0.4 W	0.3 NW	None.
20 do	0.3 N	None.	None.	None.		None.	None.	0.3 NW	0.3 NW
30 do	0.2 NNW	0.3 W	.....	None.		None.	.....	None.	None.
50 do	0.2 NNW	0.3 WNW	.....	.....		.....	.....	.....	.....

Depth.	Friday—Continued.		Saturday, 15th Aug., 1896.						
	16.10	19.05	9.15	11.15	13.30	15.45	16.50	17.35	
Surface.....	0.6 NNW	0.5 W	0.4 WSW	0.3 W	0.6 NNW	0.6 N b W	0.4 N b E	0.3 NNE	
3 fathoms...	0.6 NW	0.5 WNW	0.4 W	0.3 W b N	0.6 NNW	0.6 WNW	0.5 NNW	0.4 N	
5 do	0.5 NW	0.5 NW	0.3 W	None.	0.4 NW	0.5 WNW	0.4 W	0.5 NW	
10 do	None.	None.	0.4 SW	None.	0.3 N	0.3 WNW	0.2 NNW	0.3 NW	
20 do	0.3 N	None.	0.4 SSW	None.	0.3 N	0.2 W	.....	None.	
30 do	None.	None.	0.2 SSW	None.	.....	None.	.....	None.	
50 do .....	.....	.....	None.	None.	.....	.....	.....	Wly.	

STATION D.—OFF MECATTINA ISLANDS. DEPTH, 45 FATHOMS.

Depth.	Wednesday, 19th Aug.				Thursday, 20th Aug.—(Continued on next page.)				
	10.40	11.35	13.20	15.05	8.40	9.50	10.35	11.40	13.35
Surface...	0.6 S b E	0.5 S	0.5 SSE	0.4 S	0.2 S	0.3 SSW	0.3 SSW	0.2 SW	None.
3 fathoms...	0.6 S b W	0.5 SSW	0.5 S	0.3 SSW	None.	0.3 SSW	0.3 S b W	0.3 SSW	None.
5 do	0.6 SW	0.6 SSW	0.4 SW	0.3 SSW	0.3 WSW	0.3 SSW	0.4 SW	0.3 W	None.
10 do	0.8 SW	0.7 SW	0.5 SW	0.5 W	0.4 WSW	0.4 W b N	0.4 WNW	0.4 W	None.
15 do .....	.....	.....	.....	.....	.....	0.4 W	0.4 W	0.5 WSW	0.4 W
20 do	0.6 WSW	0.5 W b S	0.4 W	0.3 W	None.	None.	None.	None.	None.
30 do	0.4 WSW	0.4 SW	0.4 SSW	0.3 SSW	None.	None.	.....	.....	.....

TABLE II.—Under-currents—*Concluded*.
STATION F.—OFF RICH POINT. DEPTH, 40 FATHOMS.

Depth.	Thursday.	Friday, 28th Aug., 1896.							
	18.40	8.50	9.50	11.25	13.40	14.40	15.00	16.25	17.30
Surface....	0.4 E b N	Slack.	0.4 ESE	0.4 SSE	None.	None.	0.5 NW	0.5 NW	0.5 N b W
3 fathoms..	0.4 E b S	0.5 E b S	0.4 SE	0.4 SSE	0.4 WNW	0.4 W	Undercur-	0.5 NW	0.5 NNW
5 do	0.4 E	Uncert.	0.4 SE	0.3 S	0.4 NW	0.4 NW	rent comes	0.6 NW	0.6 NNW
10 do	None.	None.	None.	Slack.	0.4 NNW	None.	up to sur-	0.3 ESE	0.3 ESE
20 do	None.	None.	.....	None.	None.	None.	face.	0.3 ESE	0.4 ESE
30 do	None.	None.	.....	None.	None.	None.		None.	None.

STATION G.—OFF COW HEAD, NEWFOUNDLAND. DEPTH, 42 FATHOMS.

Depth.	3rd Sept.	Tuesday, 8th Sept.					Wednesday, 9th Sept.		
	14.45	11.15	13.15	15.15	17.00	18.40	8.30	10.10	11.25
Surface....	0.3 NNW	0.5 NE	0.5 N b E	0.6 N b E	0.5 N	0.4 NNE	0.7 ENE	0.7 ENE	0.6 E b N
3 fathoms..	.....	0.4 NE	0.5 N b W	0.6 NNW	0.5 NNW	0.4 N	0.7 ENE	0.7 ENE	0.6 E b N
5 do	0.5 NNW	0.4 NE	0.6 N b W	0.4 NW	0.6 NNW	0.3 NNE	0.6 ENE	0.6 E b N	0.4 E b N
10 do	0.6 NNW	0.4 NE	0.5 N b E	0.4 N b E	0.5 N	0.3 N	0.5 ENE	0.5 E b N	0.4 E b N
20 do	None.	0.4 NE	0.4 NNE	0.3 N b E	None.	0.3 N	0.3 ENE	0.3 E b N	0.3 ENE
30 do	None.	0.3 NE	.....	0.3 N b E	None.	0.3 N	0.5 ENE	0.4 E b N	0.2 ENE

Depth.	Wednesday—Continued.				Thursday, 10th Sept.			
	13.10	15.05	16.10	17.25	8.55	10.25	12.45	14.50
Surface....	0.6 E b N	0.4 E b N	0.3 ENE	— E b N	0.7 ENE	0.7 ENE	0.8 ENE	0.7 ENE
3 fathoms..	.....	0.4 ENE	0.3 ENE	.....	0.7 ENE	0.7 ENE	0.9 ENE	0.7 ENE
5 do	0.5 E b N	0.3 —	.....	0.5 E	0.6 ENE	0.7 ENE	0.8 ENE	0.7 NE b N
10 do	0.4 E b N	0.3 ENE	0.4 ENE	0.5 E	0.7 ENE	0.7 ENE	0.6 ENE	0.5 NE b N
20 do	0.3 E b N	0.3 ENE	0.3 ENE	0.3 E	0.5 ENE	0.5 ENE	0.4 ENE	None.
30 do	None.	None.	None.	0.3 E	0.5 ENE	0.5 ENE	0.4 ENE	None.

Depth.	Thursday—Concluded.		Monday, 14th Sept., 1896.					
	16.00	18.40	13.10	13.50	14.20	16.55	17.50	Remarks.
Surface ...	0.6 NE b E	0.6 NE	None.	None.	0.1 ENE	0.1 N	0.1 N b W	Very little current except at 10 and 20 fathoms.
3 fathoms.	0.6 NE	0.5 NNE	Slack.	None.	Slack.	0.1 NW	0.1 N b W	
5 do	0.5 NE b N	0.4 NNE	Slack.	None.	.....	.....	.....
10 do	0.6 NE b E	0.5 N b E	Slack.	0.5 NNE	0.5 NNE	0.4 NW	0.5 NNW	
20 do	None.	0.2 ENE	Slack.	0.3 NNE	.....	0.4 NNE	None.
30 do	None.	None.	Slack.	None.	.....	None.	None.

APPENDIX No. 4.

METEOROLOGICAL OFFICE,

TORONTO, 15th August, 1896.

Major F. GOUBDEAU,
Deputy Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit herewith the twenty-fifth annual report of the Meteorological Service, this report being for the fiscal year 1st July, 1895, to 30th June, 1896, with Appendices A and B, reports on Quebec and St. John observatories.

During the past year, owing largely to the means of disseminating the daily forecasts having been increased, much more interest has been manifested by the public in all branches of this service, the daily wind bulletin issued at 10 a. m., and posted at the principal ports on the lakes and the maritime provinces being much appreciated. The train weather signal system has been extended to the Ontario division of the Michigan Central Railway, and in Nova Scotia to the Dominion Atlantic Railway. Arrangements are also being made to extend the system to the Prince Edward Island Railway, these signals being of considerable service to the farming community more especially during harvest time. It is also proposed, and arrangements have been almost completed, for the posting each day in Toronto of a weather map similar to those employed in the principal cities in the United States, showing at a glance the actual weather prevailing over Canada and the United States at 8 a. m. These charts may in time be extended to other cities in Canada.

Much valuable data regarding the climate of the country has been collected from the voluntary observers to whose earnest care this service is much indebted. These observers now number 236, and continue to increase, forty-four having been added during the past year, thereby increasing considerably the clerical work of this office, all their observations having to be reduced to their several mean values. Among the most valuable additions to the list of stations are a number in the northern and eastern portions of Ontario, from which districts observations are much needed. Some important stations in Manitoba and British Columbia have also been added.

Following is a list of the stations added during the past fiscal year from which reports are received:—

Ontario.

Class II.—

Fort Francis, Rainy Lake.....	W. W. Birdsall.
Collingwood, "Kiononta Farm".....	F. Dawson.
Agincourt, East York.....	G. H. Dean.
Otonabee, Peterborough.....	J. M. Drummond.
Bobcaygeon, Victoria.....	J. Cairnduff.
Desbarats, Algoma.....	E. H. Twight.
Erasmus, Wellington.....	George Wood.
Weston, West York.....	E. Smith.
Vankleek Hill, Prescott.....	Rev. J. Macleod.
Emo River, Algoma.....	A. Locking.
Bloomfield, Prince Edward.....	W. R. Bowerman.

Ontario—Concluded.

Class III.—

Linden Valley, Victoria.....	J. Sanderson.
Camden, Addington.....	J. Teskey.
Ursa, Peterborough.	C. J. M. Kettle.
Kitley, Leeds.....	R. Gile.
Montagen, Leeds.....	J. Chalmers.
Parma, Lennox.....	C. R. Allison.
Arden, Addington..	T. Anderson.
Jermyn, Peterborough.....	Wm. Armstrong.
Cherry Valley, Prince Edward.....	L. Platt.
Westport, Leeds.....	W. McNight.
Sparrow Lake, Ontario.....	A. Waineko.
Lansdowne, Leeds.....	J. C. Stafford.
Roblin's Mills, Lennox	E. Roblin.
Wooler, Northumberland.....	J. C. Dunn.
Emsdale, Muskoka.....	William Jenkin.
Fenelon Falls, Victoria.....	S. J. Reazin.
Port Hope, Durham.....	W. W. Barret.

Quebec.

Class II.—

Gaspé Village, Gaspé.....	J. Slous.
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Nova Scotia.

Class II.—

Guysborough, Guysborough	E. B. Smith.
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Manitoba.

Class II.—

Rosebank, Selkirk.....	W. Irvine.
Russell, Marquette.....	E. A. Struthers
Treherne, Marquette.....	J. Cooper.
Mellendean, Selkirk	William Stark.

Class III.—

Rathwell, Marquette	C. O. Evans.
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North-west Territories.

Class II.—

Macleod, Alberta.....	S. B. Steele.
Yarrow, Alberta.....	G. T. Berry.

British Columbia.

Class II.—

Kootenay Reclamation Works.....	W. Henderson.
Garrey Point, New Westminster.....	William McColl.
Tobacco Plain, East Kootenay.....	M. Phillips.
Quatsino, Vancouver Island.....	B. W. Leeson.

Class III.—

Victoria Water Works, Vancouver Island.....	
Nanaimo, Vancouver Island	M. Bray.
Valdez Island, Gulf of Georgia	T. Bell.

The following stations have been closed, observations having been discontinued:

Quebec.—Class II., St. Hyacinthe..... Observer resigned.
 N.W.T.—Class II., Saskatoon..... Observer moved.
 B. C. —Class II., Duncans..... Observer moved to Victoria.

On August 27th, Mr. W. G. Knight, the observer at the telegraph reporting station at Swift Current, N.W.T., who had acted as agent for this service for many years, died and was succeeded by Mrs. Maud Knight.

In January, 1896, the Reverend Canon J. Flett having discontinued the observations at the telegraph reporting station at Prince Albert, Mr. C. O. Davidson was appointed agent.

In January, the station at Ottawa was raised to a telegraph reporting station and Mr. W. T. Ellis was appointed observer.

On 2nd March, Mr. George Macleod, agent at the telegraph reporting station at Banff, N.W.T., died after a long and painful illness, and Mr. Norman B. Sanson was appointed observer in his place.

On 31st March, Mr. John Murray, agent at the telegraph reporting station at Spence's Bridge, died after a brief illness and Messrs. Clyde and Munro continued the observations to 30th June. Mr. Murray was a most conscientious observer and his death is much regretted. Kamloops having been considered a more central position than Spence's Bridge for a telegraph reporting station, it is proposed to close the latter station immediately and establish one at Kamloops in its stead.

In June, a storm signal station was opened at Fox River, Quebec, with Mr. Alexis Dufresne as agent. This place is frequented by a large number of fishing vessels and the storm signals are much appreciated.

The shipping interests at Warton, Ont., being considerable a storm signal station was established at this place in the spring of 1896, with Mr. H. R. A. Ely as agent.

CENTRAL OFFICE.

No change in the staff of the central office has taken place during the past year; in order to keep pace with the work, however, which is rapidly increasing, some additional assistance will shortly be required.

STORM SIGNALS.

There were not very many heavy gales during the past year, but of those that occurred, with few exceptions, early warning was given of their approach. Perhaps the three most violent storms of the year in the lower lake region, occurred on 28th September, 6th October and 17th October; twelve, six and twenty-four hours notice of their approach respectively being given. In the gulf and maritime provinces, some of the heaviest gales occurred on October 12th and 16th, November 19th and 25th, December 2nd, 5th and 10th and March 11th, and warning of their approach was given from six to twenty-four hours in advance. The list of wrecks and loss of life on the great lakes and along our Atlantic seaboard, does not appear large and in many cases mariners acknowledge that they derive great benefit from heeding the storm signals.

TABLE I.

The following table shows the total number of warnings issued and the percentage verified:—

YEAR.	No. Issued.	No. Verified.	Percentage Verified.
1877	743	510	68·6
1878	860	673	78·3
1879	712	591	83·0
1880	889	736	82·8
1881	854	727	85·1
1882	841	658	78·2
1883	1,085	858	79·1
1884	798	663	83·2
1885	830	741	89·3
1886	906	799	88·2
1887	1,093	972	88·9
1888	897	758	84·5
1889	1,126	926	81·3
1890	1,199	987	82·3
1891	1,019	826	81·2
1892	1,161	888	80·7
1893	1,317	1,118	84·9
1894	1,333	1,149	86·2
1895	1,285	1,169	91·0
1896—six months, 1st January to 30th June.....	297	259	87·3

WEATHER FORECASTS.

Weather forecasts have been issued regularly during the past fiscal year, being published by most of the leading newspapers throughout the Dominion and also posted in about 1,500 telegraph offices in Manitoba, Ontario, Quebec, and the maritime provinces. In addition to these forecasts a bulletin message giving the expected direction and force of the wind during the next 36 hours, and when thought advisable a general statement of the probable movement of storms, is telegraphed to the harbour masters or others at the principal ports on the lakes and in the maritime provinces where they are posted in conspicuous places in frames provided for the purpose. These wind bulletins are evidently much appreciated as will be seen from the following quotations from a few of the many letters received from the harbour masters and others who post them.—B. Clow, Murray Harbour, P.E.I.—“The people generally, as well as the sea-going ones, have been watching it closely.” B. W. Henesey, Port Hawkesbury, N.S.—“I feel satisfied that it has been of good service to many masters of vessels.” C. P. Terris, Arichat, N.S.—“I have to bear testimony to the accurateness of the service in most instances.” E. McFarlane, Annandale.—“The weather bulletin has been received very regularly and posted, and while being so received was eagerly looked for by all who might be benefited, and would be greatly missed during the fishing season.” George Conroy, Tignish, P.E.I.—“The storm warnings are appreciated by masters of vessels frequenting this part of the province and during the past season the service has given ample time to prepare for approaching storms.” J. A. Matheson, Campbellton, P.E.I.—“I think it was quite an advantage to fishermen as I frequently noticed them coming to look at the probabilities before going out in the morning.” Joseph Ramsay, Campbellton, P.E.I.—“Vessel men found it very useful and were warned upon several occasions not to go to sea thus avoiding heavy gales.” Robert Thompson, Owen Sound, Ont.—“I consider it of great benefit especially to the smaller class of vessels.” W. H. McEvoy, Amherstburg, Ont.—“It has been of great service to vessel men—our early morning report has been very accurate and has been regarded by masters of American ships as most reliable.” Robert MacAdams, Sarnia, Ont.—“It is looked for with interest by the townspeople.” John L. Clark, Port Dalhousie,

Ont.—“It has been posted every day at the canal office and is a great benefit to the captains of boats passing up and down the canal.” W. P. Cooke, Port Arthur, Ont.—“Weather bulletins have been posted at the meteorological office and post office regularly during the summer, and have been regularly consulted and acted upon by all interested therein.” Sylvester Brothers, Toronto.—“Your predictions were so wonderfully correct that few, if any, craft large or small thought of leaving port without reference to the weather report.” James Hemlow, Liscomb, N.S.—“They have been of much value to vessels making this port their harbour, fishing vessels, especially in the fall and winter, make this their harbour as it is always free of ice, and when in port frequently, I may say daily, come ashore to find out the probabilities.” Peter McNeil, St. Peter's, N.S.—“There were two boats stayed in port recently when they saw the warning, and now consider themselves very lucky. A vessel lay here the same day and the captain is glad he did so.” J. A. McGowan, Shelburne, N.S.—“I consider it very beneficial to mariners, and find it is being consulted more and more as it becomes better known.” S. H. Crowell, North Sydney, N.S.—“I just called upon a couple of our ship brokers and they say that they have in company with different captains frequently called to see the weather report during the year, and can safely affirm that many captains have been influenced by these mid-day reports, and that the reports in the main have been very accurate and have been highly appreciated.” H. McDonald, Port Morien, N. S.—“Masters of vessels and fishermen always look to the bulletin before leaving port, and it is correct every time.” John Gunn, Pictou, N.S.—“As late as last week there were three boats going to Pictou Island which had been detained here with unsettled weather and would not leave. They all have faith in it.” Arthur Newberry, Charlottetown, P.E.I.—“I am of opinion that shipping largely rely upon these predictions.” Samuel Hemphill, Georgetown, P.E.I.—“The correctness of the forecast is generally commented on and on that account it is much appreciated, it is invaluable, and many a boat and vessel has had reason to feel thankful for having seen the bulletin in time.” Wesley Myers, Victoria, P.E.I.—“We all consider it a benefit to mariners, and captains of vessels are governed by it.” Joseph Gallant, Rousticoville, P.E.I.—“I consider them of great value to mariners and fishermen.” Mrs. C. C. Seely, Grand Manan,—“The fishermen seem to find it of great benefit to them, buyers of frozen fish seem to be guided a great deal by it.”

Warnings of the approach of storms likely to block trains by snow were issued to the railways and apparently are much appreciated.

The train weather signals have been displayed as usual during the summer months, these signals being principally for the benefit of the farming community along the lines of railways.

Special predictions were issued as usual without charge to all persons applying for them.

The following table (No. 2) shows the predictions and the percentage of fulfilment in each district in each month and in the whole period.

TABLE II.—METEOROLOGICAL SERVICE—Number of predictions and percentage of fulfilment in each district, in each month and in the year July, 1895, to June, 1896.

MONTH.	MANTOBA.					LOWER LAKE REGION.					GEORGIAN BAY.					OTTAWA VALLEY.				
	Number of predictions.	Verified.				Number of predictions.	Verified.				Number of predictions.	Verified.				Number of predictions.	Verified.			
		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.		Number fully.	Number partly.	Number not.	Percentage.
1895.																				
July.....	86	66	11	9	83.1	116	92	19	5	87.5										
August.....	92	79	10	3	91.3	108	92	13	3	91.2										
September.....	91	47	22	22	63.7	114	85	15	14	81.1										
October.....	102	76	11	15	79.9	123	100	15	8	87.4										
November.....	78	58	10	10	80.8	114	92	14	8	86.8										
December.....	91	59	17	15	74.2	107	72	17	18	75.2										
1896.																				
January.....	85	62	13	10	80.6	111	68	25	18	72.5										
February.....	80	69	8	3	91.2	90	70	11	9	83.9										
March.....	79	46	13	20	69.4	91	68	10	13	80.2										
April.....	74	47	15	12	73.6	94	72	15	7	84.6										
May.....	76	51	18	7	78.9	117	85	21	11	81.6										
June.....	84	65	11	8	84.0	111	84	16	11	82.9										
Total.....	1,018	726	168	134	79.0	1,296	980	191	125	83.0	494	370	67	57	81.7	481	378	61	49	84.9

TABLE II.—METEOROLOGICAL SERVICE—Number of predictions and percentages of fulfilment in each district, &c.—Continued.

MONTH.	UPPER ST. LAWRENCE.					LOWER ST. LAWRENCE.					GULF.					MARITIME.					TOTAL.				
	Verified.					Verified.					Verified.					Verified.					Verified.				
	Number of predictions.	Number fully.	Number partly.	Number not.	Percentage.	Number of predictions.	Number fully.	Number partly.	Number not.	Percentage.	Number of predictions.	Number fully.	Number partly.	Number not.	Percentage.	Number of predictions.	Number fully.	Number partly.	Number not.	Percentage.	Number of predictions.	Number fully.	Number partly.	Number not.	Percentage.
1895.																									
July.....	107	82	16	9	84.1	101	76	15	10	82.7	110	89	14	7	87.3	114	86	24	4	86.0	634	491	99	44	85.3
August.....	100	83	11	6	88.5	97	75	11	11	83.0	108	87	16	5	88.0	117	96	17	4	89.3	622	512	78	32	88.6
September.....	105	84	8	13	83.8	103	80	8	15	81.5	101	84	10	7	88.1	109	88	13	8	86.7	623	468	76	79	81.2
October.....	121	100	14	7	88.4	116	90	21	5	86.6	120	91	21	8	84.6	125	102	17	6	88.4	707	559	99	49	86.1
November.....	101	83	13	5	88.6	97	81	11	5	89.2	97	95	6	6	90.7	97	78	10	9	85.6	584	477	64	43	87.2
December.....	94	65	9	20	73.9	94	65	12	17	75.5	96	62	17	17	73.4	108	68	24	16	74.1	590	391	96	103	74.4
1896.																									
January.....	91	61	19	11	77.5	85	64	9	12	80.6	87	63	13	11	79.9	113	80	27	6	82.7	572	398	106	68	78.8
February.....	93	73	7	13	83.3	90	77	5	8	88.3	87	68	10	9	83.9	102	82	12	15	86.3	726	586	69	71	85.6
March.....	93	68	14	11	80.6	93	67	11	15	78.0	102	66	15	21	72.1	109	74	15	20	74.8	755	530	101	124	76.9
April.....	89	65	12	12	79.8	83	61	11	11	80.1	83	70	6	9	85.9	86	57	24	5	80.2	687	499	111	77	80.7
May.....	105	82	16	7	85.7	95	77	12	6	87.4	95	79	18	8	82.3	103	79	16	8	84.5	811	607	137	67	83.3
June.....	97	79	12	6	87.6	104	75	19	10	80.3	107	72	19	16	75.2	105	84	15	6	87.1	816	622	117	77	84.6
Total.....	1,196	925	151	120	82.8	1,158	888	145	125	82.9	1,196	907	165	124	82.7	1,288	974	214	100	83.9	8,127	6,140	1,163	834	82.6

NOTE.—The percentage of verification is obtained by taking the sum of those fully verified and half the sum of those partly verified and dividing by the whole number.

UNITED STATES WEATHER BUREAU.

The chief of the United States Weather Bureau has continued to interchange reports with this office, and I desire to express my warm appreciation of the uniform courtesy that has characterized all communications from that office.

PUBLICATIONS.

Applications are frequently made by persons and institutions in different parts of the world for the publications of this office. Over 800 copies of the Monthly Weather Review and Toronto General Meteorological Register are distributed immediately upon their being printed. Five hundred Weather Charts are issued on about the 7th of each month, many of which are posted in conspicuous places for reference.

LIBRARY.

During the past year some improvement has been made in the library by the addition of some book cases, which were much needed. The publications received consist of two hundred and twenty-nine books, pamphlets and annual reports, and twenty-one daily, weekly and monthly reports. No binding have been undertaken during the past ten years, many valuable reports and other works will require to be bound, in order to save them from total destruction.

INSPECTION OF STATIONS.

During the past fiscal year stations were inspected, and the necessity of frequent and careful inspection and adjustment of instruments, was very apparent.

The following stations were inspected by Mr. H. V. Payne, from whose report some extracts are made:—Port Arthur, Fort William, Winnipeg, Qu'Appelle, Swift Current, Medicine Hat, Fort Macleod, Edmonton, Calgary, Banff, Glacier, Spence's Bridge, Chilliwack, Agassiz, Port Simpson, Rivers' Inlet, Esquimalt, Kamloops, Grand Prairie, Vernon, Enderby, White River, Schreiber, Kingston, Kingston (Tete du Pont barracks), Deseronto, Picton, Wiarton, Owen Sound, Presqu'Isle, Collingwood, "Kiononta Farm," Blue Mountains.

At Port Arthur the approaches to the signals were found unsafe and were repaired, arrangements were also made for giving wind instruments better exposure. At Fort William, Ont., it was found that instruments were not being properly attended to and some repairs and painting were necessary. At Winnipeg instruments were adjusted and agent was instructed with regard to certain errors found in observations. At Qu'Appelle all instruments were tested, and the agent was instructed with regard to rainfall observations. At Edmonton, N.W.T., the position of instruments not being suitable they were moved, giving them better exposure. At Swift Current, N.W.T., an observer having just been appointed she was instructed regarding the observations and all instruments were tested. At Banff it having been proposed to erect an anemometer on some well exposed position, surrounding mountains were examined, instrumental comparisons and tests were made and the observer's assistant was instructed. At Agassiz the position of instruments was not suitable and instructions were given to move them. At Esquimalt, B.C., the barometer was cleaned, a position was selected for a rain gauge and instruments were tested. At Grand Prairie the observer having died an attempt was made to obtain another observer without success, so the instruments were taken away. At Schreiber the position of the rain gauge not being good it was changed. At Kingston comparisons of the instruments were made with standards and the position of some of the instruments, and the signal mast not being good, it was recommended that they should be moved. At Picton the signal mast was found in bad condition and was repaired and painted. At Wiarton a signal agent having been appointed he was instructed in his duties. At Owen Sound repairs to the signal mast were

found necessary. At Presqu'Isle the anemograph was put in order. At "Kiononta Farm," near Collingwood, thermometer shed was properly adjusted.

The following stations were inspected by Mr. B. C. Webber:—Parry Sound, Gravenhurst, Burk's Falls, Sprucedale, Eau Claire, Mattawa, Clontarf, Renfrew, Rockliffe, Winnipeg, Portage la Prairie, Minnedosa, Brandon, Qu'Appelle, Indian Head, Regina, Prince Albert, Battleford, Swift Current, Calgary, Banff, Carmanah, Esquimalt, Agassiz, Chilliwack, Spence's Bridge, Kamloops, Edmonton, Chaplin and Medicine Hat.

At Parry Sound a new electrical vane was erected and all instruments were examined. At Burk's Fall the thermometer shed, which had been erected upside downwards, was adjusted and the observer was instructed. At Mattawa the observer was instructed with regard to rainfall observations, &c. At Renfrew the rain gauge was found to be out of repair. At Rockliffe, Ont., a new barometer was supplied and a better exposure for the anemograph was examined and approved.

At Winnipeg all instruments were examined and the work of the station was carefully gone over. At Minnedosa the barometer was reading too low and the wind vane was not working properly; these instruments were adjusted. At Qu'Appelle the barometer was cleaned and comparisons of other instruments were made. At Indian Head the observer was instructed with regard to the observations. At Prince Albert a new structure for the anemometer and a new site for other instruments was found necessary. At Battleford the barometer was cleaned and a spare instrument was left, the sunshine recorder was also adjusted. At Swift Current a new set of electrical instruments was supplied, the barometer was cleaned and the rain gauge was adjusted. At Medicine Hat barometers were cleaned and tested and old rain gauge was replaced by new one. At Calgary a structure was erected for the anemometer and the thermometer shed was repaired and moved to another site. At Banff the barometers were tested and adjusted, and the observer was fully instructed with regard to the manipulation of the wet and dry bulb thermometers. A site for an anemometer on Tunnel Mountain was also examined and reported on. At Carmanah, B.C., the barometer was cleaned and rain gauge which was much worn was replaced by a new one. At Esquimalt all instruments were examined and were found in good order. At Spence's Bridge instruments were tested and barometers were cleaned. At Kamloops, full instructions were given to the observer regarding the observations, it having been proposed to establish a telegraph reporting station at that place. At Edmonton, several repairs were found necessary and all instruments were examined and adjusted. At Fort William the signal mast was found to have been heaved by the frost and instructions regarding it were given. At White River all instruments were tested, and a position for the anemometer on the station roof was suggested and approved.

The following stations were inspected by Mr. F. N. Denison,—Southampton, Kincardine, Goderich and Stratford.

At Southampton the electrical anemometer and vane was much in need of attention and was put in thorough working order, and other instruments were tested. At Kincardine the foundation of the signal house was in need of repair and instructions regarding it were given, all instruments were examined. At Goderich the signal mast having been destroyed a new one was erected, and the electrical anemometer was adjusted. At Stratford, instruments were examined and instructions regarding them were given.

Respectfully submitted,

R. F. STUPART,
Director.

MAGNETIC OBSERVATORY.

TORONTO, 15th August, 1896.

Major F. GOURDEAU,
Deputy Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit herewith the report on this observatory for the fiscal year ended 30th June, 1896.

During the year the regular routine magnetical and meteorological observations have been carried on as in past years, and the photographic instruments, barograph, thermograph, and magnetographs have been kept in operation, the curves from which turn out satisfactory. Field observations made by the director have been continued on Sundays at a point two hundred yards magnetic north of the observatory, well removed from all influence of buildings, in order to determine the amount of the effect of the new school of science and adjacent buildings on the various magnets in the observatory.

The determinations made in this manner have shown that all the magnets are affected and constant corrections will have to be applied. On account of the invariable vibration of the magnets caused by the electric cars all absolute determinations have to be made on Sundays when the cars are not running. The effect of the electric currents on our magnets certainly impairs the value of the magnetic observations at this observatory, but by no means renders them worthless, as corrections can be applied and our photographic traces show very clearly the daily curves, and our records of anything approaching a storm are probably as valuable as they ever were. The magnetic daily mean absolute values have been regularly charted on millimetre paper forming curves, which, with daily observations of the sun spots made with the six inch equatorial afford valuable data for magnetic research. During the year the value of the magnetic elements have each day been sent to Washington where they are used with those of other magnetic observatories in an investigation into the relationship between meteorological and magnetical phenomena. The principal magnetic storms occurred on 12th and 13th July, 9th and 10th August, 29th and 30th September, 12th, 13th, 23th and 29th October, 9th and 10th November, 4th March, May 2nd and 3rd.

On April 28th the suspension thread of the upstairs declinometer broke, the magnet was resuspended, and the break measured by means of the photographic trace. In December the vertical force magnetograph needle was dismantled to put on a damper to see if the vibrations caused by the trolley cars could be lessened, but no great improvement could be seen. Spider webs were noticed on the declinometer magnetograph needle in May. On the 20th the outside cover was removed and the magnet cleaned of webs. Hourly tabulations from the curves were duly made and results abstracted.

Eye observations to control the automatic records of the barograph and thermograph are taken tri-daily and the arrangement is very satisfactory. The residual correction to the barograph is .005 and the zeros of the thermograph standard thermometers were redetermined in the commencement of April, also maximum and minimum in the same shed and were found to be unchanged. During the excessively cold weather in February the thermograph clock stopped. The cover of the instrument was taken off and the clock thoroughly overhauled and it has been running satisfactorily since. On 19th June the barograph clock cord broke. A new one was at once put on. The magnetic clock has been running uninterruptedly throughout the year. In December the gravity battery was substituted for the law as the latter's action deteriorated rather quickly, since then there have been very few breaks in the magnetic cut-offs. A summary of magnetic changes is added each month to the monthly Weather Review.

TIME SERVICE.

During the year ending 30th June, 1896, observations of stars in the meridian for time on 97 days and 11 solar transits during long intervals of cloudy nights were taken at the Toronto Observatory in which 362 stars have been observed. The positions of the stars as given in the "*Berliner Jahrbuch*" have as formerly been used in the reductions.

Determinations of the collimation error of the transit instrument have frequently been made, chiefly by micrometrical measurements on the cross wires in the collimating telescope.

An unusual number of visitors have been shown over the observatory this year, and at night time a great many parties were accommodated with views of the celestial bodies through the six-inch equatorial telescope.

The total eclipse of the moon on the 3rd September, 1895, was observed with the large telescope and was watched by an interested number of spectators gathered under the dome of the observatory tower. The various phenomena connected with the eclipse were noted, the night being beautifully clear at Toronto. The darkness of this eclipse was more marked than that of 10th March last, and during totality the moon presented a decided deep coppery colour. The occultations of four faint stars were observed, and the times of their disappearance noted. At 2.30 a.m. of the 4th aurora was observed in the north Class III., with some streamers.

The regular sun spot observations were continued throughout the year, and maps 4 inches in diameter obtained on 219 days. A maximum period occurred from the 7th to the 15th July, followed by a well-marked minimum to the 26th, and from the 29th July to the 7th September another maximum occurred, the period from the 1st to the 11th August being marked by numerous beautiful groups stretching across the central portion of the sun from east to west. 8th to the 25th September was a moderate minimum period, and from the latter date to the 9th October a well-marked maximum was observed, consisting of a number of large groups. Moderately marked maximum and minimum periods alternated until the 11th April, 1896, when a remarkably long continuous minimum set in, lasting up to the 27th May. During this time the sun was completely free of spots on the 14th April, this being the first day of no spots on the sun since the observations were commenced 15th March, 1895; also on the 15th and 17th April and the 16th May the sun was clear of spots. On many days of this period only the minuteest pinhole of a spot was observed. From the 27th May to the 30th June a moderate maximum prevailed.

The exchange of time between the observatories at Montreal, Quebec, St. John and the Toronto observatory have taken place as usual, the comparisons being registered on the chronograph. The errors of the Toronto clock and the different timepieces used by the observers, being computed from the latest observations.

The time has also been given regularly on time exchange days to Halifax up to the 7th April when it was discontinued.

The examination of the clock and chronometer comparisons and observations sent in from the observatories at Quebec and St. John has been performed.

The following table shows the difference between the "adopted time" and that given at the different exchanges. The sign + indicates that the time as sent from the various observatories is faster than the "adopted time." This latter time is the arithmetical mean of the times as determined at Toronto and Montreal.

		Toronto.	Montreal.	Quebec.	St. John.
1895.		Seconds.	Seconds.	Seconds.	Seconds.
July	11	+0.10	-0.10	+0.45	+0.63
do	30	+0.15	-0.15	+3.80	+1.62
Aug.	16	-0.02	+0.02	+0.88	+0.49
Sept.	4	+0.22	-0.22	+1.59	+1.52
do	24	0.00	0.00	+0.13	+2.31
Oct.	8	-0.82	+0.82	-1.27	+0.69
do	24	-0.30	+0.30	+0.22	+0.51
Nov.	22	-0.39	+0.39	+0.09	+0.53
Dec.	10	-0.22	+0.22	+0.39	+0.17
do	27			+2.94	+0.70
do	30	+0.21	-0.21		
1896.					
Jan.	21	+0.08	-0.08	-0.63	-0.38
Feb.	12				-3.04
do	13	-0.17	+0.17	-0.10	
do	28	-0.09	+0.09	-0.14	+0.43
March	17	+0.15	-0.15	+1.11	+0.09
April	7	-0.30	+0.30	-1.37	+0.16
do	22			-0.71	+0.95
do	23	-0.16	+0.16		
May	7	-0.45	+0.45	-0.81	+0.47
do	27	-0.32	+0.32	-1.13	+1.50
June	11	-0.83	+0.83	-1.25	+1.32

Respectfully submitted.

R. F. STUPART,
Director.

APPENDIX A.

QUEBEC OBSERVATORY,
QUEBEC, August, 1896.

To the Director,
Meteorological Office, Toronto.

SIR,—I have the honour to submit the following report of the Quebec Observatory for the fiscal year ending 30th June, 1896.

All the meteorological observations were taken daily as heretofore, and transmitted to the central office at 8 a.m. and 8 p.m., and the bi-hourly temperatures were continued on the Citadel. Upon instructions from the Meteorological Office the storm-drum was not used this year.

The time was determined at the observatory by means of the transit of the standard stars every fine night, and also by the sun.

During the winter, and especially during the spring thaws, I noticed that the transit instrument is not placed upon ground sufficiently solid. On various occasions during the space of 24 hours I found a considerable change in deviation and inclination.

The correct standard time (75th meridian) was daily given to the city by means of the noon day gun, and during the navigation season, which, this year, began on the 27th of April, to captains of vessels by means of the time ball at 1 p.m.

The correct time was also given to watchmakers and other persons nearly every day by means of the telephone.

Several chronometers have also been rated at this observatory during the year.

Two failures of the ball and a few of the gun occurred during the year, there being no current on the telegraph line at the time.

The whole respectfully submitted.

ARTHUR SMITH,
Director Quebec Observatory.

METEOROLOGICAL OFFICE,
TORONTO, 20th August, 1896.

Major F. GOURDEAU,
Deputy Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to inclose herewith the annual report of the St. John observatory for the fiscal year 1895–96 this being Appendix B to my report forwarded on the 18th instant.

I have the honour to be, sir,
Your obedient servant,

R. F. STUPART, per F. P.,
Director.

APPENDIX B.

ST. JOHN OBSERVATORY.

St. JOHN, N.B., August 15th, 1896.

R. F. STUPART, Esq.,
Director, Meteorological Service,
Toronto, Ontario.

SIR,—I have the honour of presenting my annual report for the fiscal year 30th June, 1896.

The usual chief station routine of meteorological observations have been continued as reported in former years.

The time service has received careful attention; observations of stars with the transit instrument for the determination of clock errors and rates, have been made at frequent intervals. The daily time signal has been given to the shipping and others, by dropping the time ball at 1 p.m., local time.

During the year electric lights have been placed in the transit room for lighting purposes as well as illuminating the diaphragm of transit telescope.

The morning weather bulletin containing the 8 a.m. probabilities, conditions of the weather throughout the continent, in general terms, and reports from stations covering the coast from Anticosti to Boston, is now received by wire from Toronto at an earlier hour, which enables me to give the bulletin wider circulation and increase its value to the shipping and other interests. This bulletin is posted in public places and published by all of the St. John daily papers, as well as other papers throughout the province. In addition to the bulletin, a report of our local meteorological conditions is published by all the daily papers here. Owing to the correctness of the forecasts wired from Toronto, I have many calls for the probabilities, especially during the stormy season.

I have the honour to be, sir,
Your obedient servant,

D. L. HUTCHINSON,
Director.

APPENDIX C.

To the Minister of Marine and Fisheries,
Ottawa.

McGILL COLLEGE OBSERVATORY,
MONTREAL, 11th March, 1897.

SIR,—I beg to submit the following report on the work of the McGill College Observatory, Montreal, for the year 1896.

The usual meteorological work in connection with the meteorological service of Canada has been carried forward without interruption throughout the year. This has consisted in: (1) A series of observation of the usual elements at four hours intervals. (2) The telegraphic observation series at 8 a.m. and 8 p.m. each day, upon which the weather probabilities depend. (3) A bi-hourly series of temperature observations from self-recording thermometers.

The time service and system of clock exchanges with the Toronto Observatory have also been conducted as detailed in former reports. Observations of 628 stars were made on 122 nights during 46 weeks. For six weeks—11th September to 24th October—clock errors were determined from the observations of the coast and geodetic survey assistants, Messrs. Sinclair and Faris, who were during that period engaged in longitude work here, and occupied our transit pier with their instrument. Comparisons of the meantime clocks, here and in the Toronto Observatory, were made on 18 days.

LONGITUDES.

During the past summer the Astronomer Royal visited Montreal on his way to Japan, and having brought with him the completed reductions of the Montreal-Greenwich longitude observations, I am able to announce the final value of the longitude of Montreal (the middle point between the two piers of the transit instruments at this observatory), as determined from the observations of Professor H. H. Turner and myself in 1892, as $4^{\text{h}} 54^{\text{m}} 18^{\text{s}} \cdot 670$. This quantity is in excess of the old value, which was obtained by connection with the United States system of longitudes, by $0^{\text{s}} \cdot 105$. The determinations upon which the American longitudes have hitherto rested were made by the United States coast and geodetic survey in 1866, 1870 and 1872. When it is considered that the cable signals were then sent on the old flash system and that the longitude operations, as conducted by the Americans, did not include an interchange of observers, the accordance of the old value with that above announced is quite within the limits of error which might properly have been assigned to the former.

During the months of May and June observations for determining the longitude of Ottawa were made in co-operation with Mr. W. F. King, of the Department of the Interior. During September and October the difference of longitude between Albany, N.Y., and Montreal was determined under the direction of Mr. C. H. Sinclair, of the coast and geodetic survey. This work completed the chain of longitude determinations between Washington, Cambridge and Montreal, and gave another connection between the American trans-Atlantic longitude determinations and our own determination in 1892.

By the kindness of Mr. Sinclair I am able to give the results of his field reduction, which makes the difference of longitude between Montreal and Cambridge $9^{\text{m}} 47^{\text{s}} 581 \cdot 011$. The difference obtained in 1883 by Professor Rogers, of the Harvard College Observatory, and myself was $9^{\text{m}} 47^{\text{s}} 550 \cdot 019$. Combining these two results we obtain $9^{\text{m}} 47^{\text{s}} 572$ as the difference of longitude between Montreal and Cambridge.

SOIL TEMPERATURES.

The soil temperature observations made in co-operation with H. L. Callendar, F.R.S., Professor of Physics in McGill University, have been continued. Two eye observations per day, at the several depths, have been taken throughout the year. The results up to the 1st May last were presented as a paper at the last meeting of the Royal Society of Canada, and will be published shortly.

I have the honour to be, sir,

Yours truly,

C. H. McLEOD,
Superintendent.

APPENDIX No. 5.

REPORT OF THE CHAIRMAN OF THE BOARD OF STEAMBOAT INSPECTION.

CHAIRMAN'S OFFICE,
OTTAWA, November, 1896.

Hon. L. H. DAVIES,
Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit herewith my annual report of the Steamboat Inspection Service, for the fiscal year ended 30th June, 1896.

The report contains statement of board meetings held during the year, appointments made, casualties occurred, and prosecutions for violation of the Steamboat Inspection Act, with the number of steamboats in the Dominion as known to the inspectors; form No. 1, showing the steamboats which were inspected, and form No. 2, the steamboats not inspected; form No. 4, shows the number of steamboats added to the Dominion, and form No. 5, the number of steamboats lost, broken up or otherwise put out of service.

There has also been inspected by the steamboat inspectors at Montreal, in addition to the steamboats inspected, the hoisting gear and ship's tackle of 382 vessels, which is used for loading and unloading the vessel.

Tables A, B and C show the total number of steamboats in the Dominion and their gross tonnage; the amount of dues and fees collected, and the number of steamboats added to the Dominion, with their gross and registered tonnage.

A.—NUMBER of Steam Vessels, inspected and not inspected, reported by the Inspectors of Steamboats in the Dominion and their gross tonnage, during the year ended 30th June, 1896.

Division.	Number of Vessels.	Gross Tonnage.
West Ontario, Huron and Superior.....	340	69,771 00
Kingston.....	156	25,848 96
Montreal.....	181	18,069 93
Quebec.....	136	36,099 00
Nova Scotia.....	123	27,475 80
New Brunswick and Prince Edward Island.....	129	17,292 51
British Columbia.....	152	22,165 09
Manitoba, Keewatin and North-west Territories.....	83	5,453 86
Total.....	1,300	222,178 15

B.—DUES and Fees collected on account of Steamboat Inspection during the year ended 30th June, 1896.

Division.	Amount.
	\$ cts.
West Ontario, Huron and Superior.....	6,838 22
Kingston.....	2,779 00
Montreal.....	2,249 63
Quebec.....	3,474 66
Nova Scotia.....	2,698 94
New Brunswick and Prince Edward Island.....	1,378 32
British Columbia.....	2,469 56
Manitoba, Keewatin and North-west Territories.....	554 82
Inspecting tow barges.....	110 00
Engineers' certificates.....	717 50
Total.....	23,205 67

C.—NUMBER of Steam Vessels added to the Dominion during the year ended 30th June, 1896.

Division.	Number of Vessels.	Gross Tonnage.	Register Tonnage.
West Ontario, Huron and Superior.....	10	240 00	162 00
Kingston.....	15	372 94	202 01
Montreal.....	12	1,122 51	667 69
Quebec.....	Nil.		
Nova Scotia.....	6	171 13	89 43
New Brunswick and Prince Edward Island.....	3	34 72	20 32
British Columbia.....	14	2,434 71	1,641 81
Manitoba, Keewatin and North-west Territories.....	6	647 20	430 10
Total.....	66	5,023 21	3,213 08

RULES AND AMENDMENTS.

During the year the rules and amendments for the inspection of steamboats, and for the examination of engineers of steamboats, have been consolidated, and sanctioned by the Governor in Council.

BOARD MEETINGS.

A meeting of a quorum of the Board of Steamboat Inspection was held at Toronto from 13th to 27th February inclusive, being composed of Inspectors John Dodds and James Johnston, of Toronto, with the chairman, E. Adams.

The meeting was held for the purpose of examining candidates for the position of steamboat inspector for the Manitoba district; also to decide on questions submitted by the inspector at Halifax pertaining to the form of pipe boiler known as the Babcock and Wilcox, to be placed for use on steamboat; and question relating to shafts for a tug boat building by the Upper Ottawa Improvement Company.

APPOINTMENTS.

On the retirement from the service of C. E. Robertson, late inspector for the Manitoba district, Mr. G. P. Phillips, of Rat Portage, who passed a satisfactory examination at Toronto, 27th February, 1896, was appointed to the position of boiler, machinery and hull inspector for said district, to reside at Rat Portage, with a salary of \$1,000 per annum, by Order in Council, 16th May, 1896.

CASUALTIES.

West Ontario and Huron Division.

July 14th, 1895.—Steamer "Cibola," of Toronto, was totally destroyed by fire at Lewiston, N.Y., originating while steamer was lying at the dock, one life was lost; cause of fire unknown.

September 5th, 1895.—Steamer "St. Magnus," of Hamilton, while on dry dock at Port Dalhousie took fire and was totally destroyed, one life being lost; cause of fire, from warehouse on dock.

October 7th, 1895.—Steamer "Africa," of Owen Sound, having in tow the barge "Severn," both loaded with coal, from Ashtabula, U.S., to Owen Sound, Ont., encountered a severe gale on Lake Huron, the tow line parted and the "Africa" fell into the trough of the sea and foundered, all hands, thirteen in number, being lost. The "Severn" was driven ashore in the vicinity of Loyal Island and went to pieces, the crew being saved.

November 3rd, 1895.—SS. "Athabasca," of Montreal, en route from Fort William to Owen Sound, when about fifty miles from Fort William the high pressure crank shaft broke. The steamer returned to Fort William and afterwards was towed to Owen Sound, where repairs were made.

East Ontario Division.

August 3rd, 1895.—Steamer "Daisy," of Port Hope, caught fire while the crew were sleeping. The vessel was totally destroyed; no lives lost.

September 15th, 1895.—Steamer "Columbia," of Port Hope, while tied up at Bobcaygeon dock, caught fire and the hull was badly burned. The crew being all on shore when fire started, no loss of life.

October 26th, 1895.—Steam yacht "Sea Gull," while lying at the dock at Port Perry, was completely destroyed by fire. Cause of fire, the explosion of a coal oil lamp.

October 31st, 1895.—SS. "Alexandria" of Montreal, struck a boulder in Lachine Canal and sank to the deck, afterwards was raised and repaired at Montreal.

November 8th, 1895.—Steamers "Hero" and "Nile" collided at night, near Huff's dock, Bay of Quinté. Both steamers were badly damaged. "Hero" was beached to keep her from sinking. The vessels afterwards were repaired at Deseronto.

November 15th, 1895.—Tug "James A. Walker," of Kingston, by striking a rock in Rapid Plat, stripped the blades off her propeller wheel, the engine running away and causing the breaking of the forward columns of the engine frame and cracking the condenser; was afterward towed to Montreal where repairs were made.

April 25th, 1896.—Tug "Eva" was totally destroyed by fire. The vessel was out on the ways at Lindsay and had been out all winter. Origin of fire unknown.

June 22nd, 1896.—SS. "Reindeer," of Kingston, while on a trip between Deseronto and Picton, broke the engine shaft and bed plate. The break was occasioned by a flaw in the shaft. Vessel was towed to Kingston where repairs were made.

Montreal Division.

September 20th, 1895.—Tug "St. Peter" and SS. "Turrett Bay," collided in the harbour of Montreal. The bow of the "St. Peter" was badly damaged and she also lost her smokestack overboard. The "Turrett Bay" proceeded on her voyage uninjured.

May 7th, 1896.—Ferry steamer "Mansfield," when on a trip between New Edinburgh and Gatineau Point, caught fire and became a total loss. Fire supposed to have originated by a spark from the furnace of boiler.

May 14th, 1896.—Steamer "Owens," a paddle tug, while lying at the Montebello wharf, caught fire and became a total loss. One man was badly burnt. The cause of fire unknown.

Quebec Division.

August 6th, 1895.—SS. "Canada," of Montreal, while on a voyage crossing from Tadoussac to Rivière du Loup in a dense fog, ran on Percil Rock and was damaged. The steamer got off with the rising of the tide, and proceeded to Quebec; was there placed on dry dock and repaired.

November 21st, 1895.—SS. "Thames," of Quebec, while on a voyage from Newfoundland to Montreal, stranded on a bank near Cape Breton and became a total loss. No lives were lost.

May 18th, 1896.—The paddle tug steamer "Beaver," of Quebec, broke her shaft between the two paddle flanges. The break was detected while lying at the wharf. It was substituted by a larger one.

Nova Scotia Division.

August, 1895.—Str. "Islet," of Yarmouth, during a fierce gale, broke from her moorings and drove ashore, becoming a total wreck.

February, 1896.—SS. "St. Pierre," of Yarmouth, foundered at sea on a voyage from Halifax, Nova Scotia, to Vancouver, British Columbia. There was no loss of life attending the disaster.

New Brunswick and Prince Edward Island Division.

July 23rd, 1895.—SS. "Prince Rupert," with triple expansion engines, running between St. John, N.B., and Digby, N.S., on leaving the wharf at St. John, broke the high pressure cylinder and was detained until changes were made to work her compound.

Again, on August 22nd, broke the coupling bolts on starboard paddle shaft on the voyage from Digby to St. John.

August 17th, 1895.—Passenger steamer "Miramichi" collided with schooner "Ascola," on the Miramichi River, the jib boom of the latter striking the steamer forward of the smokestack, tearing it away, and sweeping one side of the upper deck to the stern. Five young lady passengers who were on the deck at the time, were swept overboard with the wreck, of whom three were drowned before assistance could reach them. An investigation was held, the result of which was the certificate of the master of the steamer was cancelled for twelve months.

August 12th, 1895.—Passenger steamer "Hampstead," and tug "Nereid," collided on St. John River, the latter striking the "Hampstead" at the forward gangway, cutting into her guards five feet, and her planking to the water's edge. Temporary repairs were made permitting her to finish the running season.

Nov. 17th, 1895.—Freight str. "Albert," of Charlottetown, P.E.I., sprung a leak at sea during a fierce gale of wind, and was abandoned in a sinking condition. The crew were saved and landed at St. Pierre, Miquelon.

June 9th, 1896.—The steam tugs "Hope" and "Maggie M" collided on St. John River. The "Maggie M" had her stern taken out to the water's edge; the "Hope" was cut through the guard to hull. The "Maggie M" was run ashore and temporary repairs made to prevent her from sinking.

British Columbia Division.

July 20th, 1895.—SS. "Coquitlan" stranded on rocks in Johnston Straits, whereby her stern and bow plates were damaged, was floated off and proceeded to Victoria, where damage was repaired.

August 1st, 1895.—SS. "Muriel," stranded and partly submerged in the Granville Channel, was raised August 6th, and temporary repairs were effected to bring her to Victoria, where she was hauled out on marine railway, and thoroughly repaired.

Nov. 1st, 1895.—SS. "Cariboo and Fly," on being taken into Mill Creek, Skeena River, to be laid up, grounded at both ends, when tide left, broke her back, a total wreck; machinery saved.

Nov. 25th, 1895.—SS. "Thistle" stranded in Chatham Sound, damaged keel, stern post and some of the planking, was got off next day, taken to Victoria where placed on the marine railway and repaired.

Dec. 22nd, 1895.—SS. "Islander" on passage to Vancouver, struck on Prevost Island, near Portlock Point lighthouse, floated off on 24th, and steamed to Victoria; extensive damage to stern, keel, keelson, frames and several plates; was hauled out on marine railway and repaired.

Dec. 27th, 1895.—Tug "Arrow" while towing a scow on Arrow Lake, Columbia River, a sudden squall capsized the steamer; master and engineer lost. The vessel was afterwards righted when it was found the boiler was lost.

Jan. 8th, 1896.—SS. "Falcon" with scow in tow on passage to Comox, fouled a log, which broke her propeller, was driven on Trial Island and broken up by seas. A total wreck.

Jan. 13th, 1896.—SS. "Vancouver" on voyage to Chemainus, stranded in San-some Narrows, was towed off and steamed to Victoria, hauled out and repaired damage fore foot and keel.

Feb. 9th, 1896.—SS. "Mary Hare," while lying at Reed Island, Cowichan Gap, at anchor and all hands ashore; the steamer caught fire, and became a total loss.

March 9th, 1896.—SS. "Comox," while moored at the Union SS. Co., wharf, Vancouver, and all hands ashore, caught fire, supposed over boiler, causing considerable damage to deck, fittings, &c., which were all repaired.

May 4th, 1896.—SS. "T. W. Carter" on voyage from Victoria to Mud Bay, struck on Trial Island, afterwards floated off and sank in deep water; a total loss.

May 12th, 1896.—Tug "Mamie" while towing broke the tail shaft by fouling floating logs, was towed to Vancouver where a new shaft was made and fitted.

Manitoba, Keewatin and North-west Territories.

Aug. 12th, 1895.—SS. "Siskiwit" of Port Arthur, while lying at the dock at Fort William, caught fire and was partially burnt, cause unknown; was again rebuilt. Amount of damage valued \$1,025.

PROSECUTIONS FOR VIOLATION OF THE STEAMBOAT INSPECTION ACT.

Results in Each Case.

Str. "Rocket"—to which reference is made in my annual report for year ending June, 1894, off having been fined for violation of the Steamboat Inspection Act, and proceedings being taken to sell the boat for payment of same.

The proceedings were not executed; the fine having been paid by defendant, to the department, December 11, 1895, by deposit receipt No. 29, Bank of Montreal, for \$130.71, being the amount of costs and fine inflicted.

April 19, 1895. Proceedings were taken against the steam tugs "Equal Rights," "Fred. Davidson," "Maud," "Doty," and "Tender," for violation of the Steamboat Inspection Act, by carrying passengers without having a certificate permitting of such.

The cases were tried before the police magistrate at Barrie, Ont., when the defendants were convicted; four of them being fined \$50 and costs, and Str. "Fred. Davidson" \$20 and costs.

The owners of "Maud," "Fred. Davidson," and "Equal Rights," paid the charges amounting in all to \$126, for which the department received deposit receipt No. 2092 of the Canadian Bank of Commerce, Barrie, for the amount.

The owners of "Tender" and "Doty" were granted an extension of time for payment; which was collected and paid to the department, 30th July, 1895, by deposit receipt No. 2115 for \$100, on Bank of Commerce, Barrie.

I have the honour to be, sir,

Your obedient servant,

EDWARD ADAMS,
Chairman Board of Steamboat Inspection.

APPENDIX No. 6.

REPORT OF CHAIRMAN OF BOARD OF EXAMINERS OF MASTERS AND MATES.

The Deputy Minister of Marine and Fisheries,
Ottawa.

HALIFAX, N.S., 19th August, 1896.

SIR,—According to instructions contained in your letter of the 3rd inst., I have prepared and herewith beg to inclose the annual report of the Board of Examiners of Masters and Mates for the fiscal year of 1895-96.

I am, sir,
Your obedient servant,

W. H. SMITH,
Chairman.

HALIFAX, N.S., 20th August, 1896.

The Deputy Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit the annual report of the proceedings of the Board of Examiners of Masters and Mates, from the 30th June, 1895, to the 30th June, 1896, the end of the fiscal year.

The board met for examinations as follows:—

Port of Halifax.....	11 times.
do St. John.....	10 do
do Yarmouth.....	1 do
do Quebec	2 do
Total.....	24 times.

There were also three examinations for candidates at Victoria, B.C.

At Halifax 10 applications were made for sea-going certificates of competency as master and 17 for mates' and 4 for second mates' certificates.

Six masters, 10 mates and 3 second mates received certificates. Ten applications were made for certificates of competency as master of coasting and inland vessels and 2 for mates' certificates, and 10 masters and 2 mates received certificates.

At St. John 14 applications were made for sea-going certificates as master competency, and 11 certificates were issued to successful candidates.

Eleven sea-going officers applied for mates' certificates and one for a second mate's certificate.

Ten mates and 1 second mate were granted certificates. Two candidates applied for certificates of competency as masters of coasting and inland vessels and 1 for a mate's certificate.

Two masters and 1 mate received certificates for the coasting and inland trade.

At Yarmouth, 2 applications were made for sea-going certificates of competency as master and both candidates received certificates.

At Quebec 1 candidate applied for a master's certificate of competency sea-going, and also 1 for a second mate's certificate.

Both candidates were granted certificates.

At Victoria, B.C., 2 applications were made for mates certificates of competency and 1 for 2nd mate's certificate.

A certificate was issued to the second mate only.

By the foregoing statement it will be observed that for the 12 months ending 30th June, 1896, 26 applications were made for masters' certificates of competency sea-going, 31 for mates' and 7 for second mates'.

Nineteen masters, 22 mates and 6 second mates were granted certificates.

Twelve applications for certificates of competency as master coasting and inland, were made to the Board of Examiners, and 3 for mates' certificates.

Twelve masters and 3 mates obtained certificates for the coasting and inland trade.

Four certificates of service were issued through the Halifax office for masters in the coasting and inland trade and 5 for mates and 4 renewal certificates of all grades.

The total number of certificates granted by the Department of Marine and Fisheries at Ottawa, including competency, service and renewal, upon applications made to the Board of Examiners at Halifax, was 74, and fees to the amount of \$794.50 were collected and deposited in the Bank of Montreal to the credit of the Receiver General, and receipts for the same forwarded to the department monthly.

Fees for the examinations of candidates at Victoria are sent direct to Ottawa by the agent of Marine and Fisheries at that port, and are not accounted for by the chairman of the board at Halifax.

This report does not include certificates of competency for coasting and inland waters, issued by the department upon examinations at any other ports than those above mentioned.

At St. John the local member of the board holds examinations for coasting and inland, and also for service certificates, and makes the return to the department direct.

Amongst the applications above enumerated, some candidates have presented themselves a second or third time for examination, for master, mate or second mate, as the case may be, having previously failed.

The names of these candidates appear upon the books at this office each time they come forward to be examined. They are, however permitted to have a second trial without paying another fee, but on each successive occasion after that, no matter how often they present themselves, the full amount of the fee is again collected from them.

The examination of candidates for deep-sea certificates of competency, is similar to that required by the Imperial Board of Trade, and any new subject of examination introduced by the British Government is adopted by Canada, and the certificates granted by the Minister of Marine and Fisheries are the same in value as those issued in Great Britain.

The examination in the colour test has from time to time been changed, improved and made more searching, and now consists of the form vision, colour vision and colour ignorance tests, which are quite sufficient to ascertain if a candidate has any defect in his sight, as it is very important that an officer in charge of the deck of a ship should be able to distinguish the colour and descriptions of lights, immediately they come in sight, whether they are carried by a ship or placed in a lighthouse on shore.

I am of opinion that it is of the greatest importance that masters and officers of ships should have no defect in their hearing, as any one in charge of the bridge or deck of a ship when under way, should be able to distinguish the report of the look-out men, and, if he is a subordinate officer, he must of necessity be able to understand the orders of the master with reference to shaping the courses of the ship when necessary, and to understand the various directions of the captain with respect to the handling of the springs when approaching or leaving a wharf, otherwise serious accidents may at any time occur.

At an investigation recently held by me, it was proved that an officer was unable to hear and distinguish the orders issued by the master, even in calm weather and smooth water, and if this officer had been further employed, serious results might have been anticipated.

The former issue of the rules and regulations governing the examinations of candidates for sea-going certificates having been exhausted, a copy of the existing rules was taken, and all the amendments and additions which have been from time to time made in Canada and the United Kingdom, were inserted, and those parts which were considered unnecessary or obsolete, were left out.

These rules and regulations were approved of by the Minister of Marine and Fisheries, and also by the Imperial Board of Trade, to whom they were submitted, and were sanctioned by an Order in Council of the 29th June, all previous rules and regulations and Orders in Council being cancelled and annulled.

I am, sir,

Your obedient servant,

W. H. SMITH,
*Chairman of Board of Examiners
of Masters and Mates.*

APPENDIX No. 7.

MESSENGER PIGEONS.

HAZEL HILL, GUYSBORO' COUNTY, N.S., 28th Sept., 1896.

J. H. PARSONS, Esq.,
Agent Marine and Fisheries Dept.,
Halifax.

REPORT *re* CARRIER PIGEONS.

DEAR SIR,—Yours of the 14th inst. received. I beg to submit the following report *re* carrier pigeons:—

Received from Sergt. Mulholland, R.E., on 24th Dec., 1895.....	55
Died	1
Young birds hatched.	57
do died.....	2
Old birds in loft, 1st July, 1896.....	54
Young do do	55
Total number.....	109

Birds were not in fit state for training at 1st July, 1896.

Yours faithfully,

S. S. DICKENSON, per D. C.

Digest of Letter of Capt. Kent, R. E., re Transfer of Carrier Pigeons from Halifax (Citadel) Loft, to Hazelhill, Canso.

31st December, 1895.

To J. PARSONS, Esq.,
Agent, Marine and Fisheries Dept.,
Halifax.

1. The pigeon loft at the Citadel was demolished on the 22nd December, 1895.

2. Sergeant Mulholland proceeded by railway on 23rd December, taking with him by express 13 boxes, &c., including 55 birds, carrier pigeons, also all the food on hand and the correspondence and books. He proceeded by steamer from Port Mulgrave to Canso, and thence to Hazel Hill in carriages.

3. Superintendent Dickinson of the Cable Service aided Sergeant Mulholland in conveying and disposing of the birds. A thick walled house 12 feet square (within) was assigned to the pigeons, and carpenter and other work done under direction of Sergeant Mulholland to adapt it to the pigeon service, and the birds were placed in their quarters. Owing to thickness of the walls, double and filled between with sawdust, artificial heating is unnecessary.

4. The books of pedigree, &c., and the correspondence were explained to a Mr. Carmichael who took the direct charge of the birds under Mr. Dickenson.

5. Before Sergeant Mulholland left Hazel Hill to return to Halifax, a floor had been laid, many roosting coops, &c., completed, wire netting fixed to the window just cut and glazed, wire netting exercise ground planned, electric light (incandescent) fixed in the room, and water arranged to be laid on.

6. Sergeant Mulholland's expenses were, travel, &c., \$25.75 and expressage on boxes of birds, \$6, certified by Capt. Kent, and subsequently paid by the department.

H. V. K.,
Supt. Signale, Etc.

Memo. of Agent Parsons's visit to the Pigeon Loft, Hazel Hill.

Early in January, 1896, I was at Canso, and spent part of an afternoon visiting and inspecting the pigeons and their quarters at Hazel Hill.

There was a double door to correspond with the double wall, and the one window gave fairly good light without admitting too much cold.

The birds seemed in good condition and the room and surroundings were clean and not ill smelling. The exercising yard was planned but not built. Mr. Carmichael, who has charge of the birds, is very intelligent and seems interested in the success of this service.

J. PARSONS,
Agent.

HALIFAX, Sept. 30th, 1896.

APPENDIX No. 8

SIGNAL SERVICE, CANADA,

QUEBEC, 27th, August 1896.

SIR,—I have the honour to inclose herewith the 14th annual report as to the services performed in this office and the agents, under the control of your department in the Signal Service, during the past fiscal year ending 30th June, 1896.

I have the honour to be, sir,

Your most obedient servant,

H. J. McHUGH,
Superintendent.

F. GOURDEAU, Esq.,
Deputy Minister of Marine and Fisheries,
Ottawa.

SIGNAL SERVICE, CANADA,

OFFICE OF THE SUPERINTENDENT,

QUEBEC, 27th, August 1896.

To the Deputy Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit the following report as to the service for the year ending 30th June, 1896.

As in preceding seasons reports have been received from the stations in the lower part of the river and gulf, recording the weather, wind, condition, location and movement of the ice during the winter and spring months, and during the season of navigation, all inward and outward vessels as signalled and seen from the stations.

Snow fell early, but did not exceed that of other seasons; ice formed slowly and harbours remained open much later than in preceding seasons.

No vessel was detained by ice in the river or gulf, this has not occurred before in the past thirteen years. With few exceptions most of the vessels inward and outward bound, from the opening of navigation to the 30th of June, encountered numerous icebergs from 300 miles to the eastward of Cape Race and Belle Isle, and to a distance of 60 miles westward of the former and of the latter, icebergs were met 20 miles west of Cape Norman in the Straits of Belle Isle.

Grosse Isle quarantine station reported as in former years, (with the exception when the cable was interrupted), all trans-atlantic vessels after having been given pratique. This service has been of great service to the shipping interests. These reports are free to the department being transmitted over the Government line to Quebec.

After the closing of navigation three reports a week are received and distributed in the ordinary way. From the 1st to the 20th April, reports were sent to the Board of Trade, Montreal, St. John, N.B., and Quebec, and to the Chamber of Commerce, Halifax, N.S., also to the press of Quebec and Montreal, to the agent of the department, Quebec, to the custom house and immigration agent, to all the agents of regular lines of steamers, tug owners, to the pilots for below and above Quebec, also to Messrs. H. Fry & Co., Lloyds's agents, Quebec.

Owing to earlier departures from foreign ports, daily reports were received and forwarded as above and also to North Sydney, during the season of navigation, from the 20th April.

The quarantine doctor at Rimouski is also supplied with a report of the incoming mail steamers, name of station and hour of passing being given when vessel first signalled.

The chief superintendent of the quarantine service at Grosse Isle is also supplied with a report of all incoming steamers, name of station and hour of passing, also weather and wind. (This applies to trans-atlantic and foreign vessels.)

Information as to the wind, weather and ice in the vicinity of Anticosti, Magdalen Islands, Meat Cove, C.B., St. Paul's Island, Cape Ray, Newfoundland, is also sent to Esquimaux Point on the Labrador coast in the month of March for the guidance of the sealing fleet.

This is the sixth season that no ice has been seen in the vicinity of St. Pierre de Miquelon after the middle of April.

Information was supplied also from this office as in past seasons to the agents at Anticosti, Magdalen Islands, Meat Cove, C.B., Cape Ray, Newfoundland, Low Point, North Sydney and Cape Race in the month of April, as to the weather, wind, movement and condition of the ice in the Gulf and River St. Lawrence up to Montreal for the guidance of any vessel calling at any of the above given stations for information.

NAVIGATION.

1895—Last outward sailing vessel, November, 16th, ship "America."

1895—Last freight steamer, November, 27th, "Turret Ball."

1895—Last mail steamer, November 18th, "Mongolian."

1895—Last coasting steamer, December 1st, "Polino."

1896—First inward freight steamers arrived on April 1st, "Flamboro" and "Loughbrigg Holme. The Allan liner "Mongolian" from Liverpool arrived on April 28th.

The first inwardbound sailing vessel arrived on May 12th, the bark "Medusa."

Navigation closed in the Gut of Canso, on January 29th, and was again open on March 25th.

Pleasant Bay, Magdalen opened on April 21st, the "St. Olaf" arrived there the same day from Pictou, N.S.

Pt. Escuminac, N.B., reported navigation open off there on April 23rd, no ice being seen after that date.

Sydney Harbour, C.B., was partially closed from February 16th to the 21st, and from that date to the 8th March, little or no ice was seen. It was again closed to the 17th, and from the 24th to the 28th of April remaining open after this latter date.

Respectfully submitted,

H. J. McHUGH,
Supt. Signal Service.

SIGNAL SERVICE, CANADA.

OFFICE OF THE SUPERINTENDENT,
QUEBEC, 31st August, 1896.

SIR,—I have the honour to inclose herewith, the Appendices A, B and C to the fourteenth annual report of the signal service up to the end of the fiscal year ending June 30th. The reports from Point Rich, Newfoundland, and Cape Ray, have not as yet been received. Upon receipt of them I will without delay forward them.

I have the honour to be, sir,
Your most obedient servant,

H. J. MCHUGH,
Superintendent.

F. GOURDEAU, Esq.,
Deputy Minister of Marine and Fisheries,
Ottawa.

APPENDIX A.

REPORT on ice, &c., in the Straits of Belle Isle and the north and west coasts of Newfoundland as noted by the Agents of the Department at Belle Isle, Cape Bauld, Cape Norman, Point Amour, Greenly Island, Point Rich, Cape Ray, Bird Rocks, from July 1st, 1895, to June 30th, 1896.

BELLE ISLE.

1895, November 20th.—Last steamer sighted.

1895, November 25th.—Last sailing vessel sighted, a bark.

1895, December 3rd.—First snow fell.

1895, December 11th.—First slob ice formed and extended to the east and west of the island. A considerable quantity drifted out from the north-east. The month was generally cloudy and had a lot of snow, sleet and rain. Winds variable, W.S.W. in the first and E.N.E. in the latter part of the month.

1896, January.—This month was fairly clear. W.S.W. winds in the first, E.N.E. in the middle and W.N.W. in the latter part prevailed. Snow on two days only, namely, the 15th and 27th. Extensive sheets of level slob ice formed and passed towards the east, moving south. About 25 icebergs passed south at the same time. From the latter date ice formed continuously, covering all the straits. Numerous flocks of ducks and other water fowl remained around the island all month.

1896, February.—A good deal of heavy ice and numbers of icebergs passed south to the eastward. On the 14th heavy northern ice, the first seen, passed south. no open water or lakes among it. Its appearance indicated old ice and not of recent formation. The icebergs were in most cases of immense size, both in length and height. North to east winds prevailed, snow fell in large quantities, drifts of from 40 to 50 feet in some of the valleys. At the end of the month there were 5 icebergs aground to the west, viz., 1 off Chateau Bay, 2 in the centre of the straits and 2 on the south shore.

1896, March.—The weather this month was very variable, heavy breezes and gales from the W.N.W., with snow, sleet and fog. On the 7th the straits were completely filled with heavy ice and over 100 icebergs stationary in it, scattered in all directions. On the 22nd a strong gale from S.S.W. drove all the ice out and left clear water extending to Cape Bauld on the south and Labrador on the north.

On the 23rd two schooners came drifting down in field ice from the westward. On the 24th slob ice formed in large quantities during the night.

1896, April and May.—Owing to prevailing north and north-east winds during this month the straits have been completely blocked with heavy northern or arctic ice and when this broke up with slob ice. No vessel could have passed through at any time this month. About 500 icebergs passed south, some of immense size, 60 remained aground to the eastwards and in the straits. The weather has been cold and a great quantity of snow has fallen. No rain fell this month. The ice started to move out on the 26th, wind being from the west until the 29th, when it hauled to the N.N.E., a strong gale filling up the straits with heavy ice to the east and west and remained so until the 22nd of May. Strong west winds set in and on the 26th the straits were clear of field ice, navigation being practically open.

1896,—June 21st. The first inward bound steamer towards the west.

No seals seen this season.

ICEBERGS.

1896—January, 16th, 10 to E.	March 28th, 60 aground.
do 20th, 12 to S. E.	April 3rd, 47 to the E.
do 21st, 13 to E.	do 6th, 100 do and W.
February, 4th, 5 to E.	do 8th, 107 do do
do 5th, 5 do	do 12th, 160 do do
do 14th, 20 to W.	do 14th, 67 to S.
March, 7th, 100 aground.	June 24th, 98 do
do 15th, 97 do	

CAPE BAULD, NEWFOUNDLAND.

As stated in the previous annual reports, the distance from Belle Isle being but 14 miles, the observations as to wind and ice vary but little.

As in the previous year no seals were sighted on shore or on drifting ice.

CAPE NORMAN, NEWFOUNDLAND

1895.—December 1st,—First snow fell.

December 11.—First ice formed and extended from inshore to across the straits and remained so until the 20th of May. N.E. winds prevailed, keeping the ice to the westward and drifted in numerous icebergs. Navigation impossible up to the latter date. No seals or vessels seen during the season. Heavy snowfalls and drifts all winter, snow fell about every second day.

ICEBERGS.

1896.—April.—25 seen daily (average.)

May.—29	do	do
June 25th.—94	to the eastward.	
do 26th.—89	do	
do 27th.—87	do	
do 28th.—80	do	
do 29th.—70	do	
do 30th.—70	do	

An average of 34 daily seen during this latter month.

POINT AMOUR, LABRADOR.

1895.—“Neptune,” Capt. Blanford, left Forteau Bay on November 10th.

November 13th.—Slob ice forming along shore.

December 1st to 10th.—Slob and shore ice formed fast and on the 11th the straits were fully covered. Seals passed in great numbers. The straits remained full of heavy northern and slob ice, with numerous icebergs here and there until the 21st of May, when all the ice moved off, leaving a few bergs aground.

May 26th.—First schooner from the west.

do 28th.—First steamer passed east.

ICEBERGS.

1896.—April.—9 daily average.

May.—11 do

GREENLY ISLAND, LABRADOR.

1895.—October 25th.—First snow, with very cold weather.

1895.—December 13th.—First slob ice formed along shore and outside to the west and south.

SEALS.

Numerous herds of seals were seen during the months of March and April.

ICEBERGS.

1895.—December 5th, 1 to the East.

1896.—April 11th, 5 to the East.

June 13th, 1 to the East.

BIRD BOOKS.

1895.—First ice formed and made rapidly on the 10th November, and the last ice seen on the 28th of April, 1896.

1896.—March 12th.—First sealing steamer off here.

April.—First inward bound steamer passed here for the St. Lawrence.

Respectfully submitted,

H. J. McHUGH,
Supt. Signal Service.

APPENDIX B.

THERMOMETER Readings at Belle Isle from 1st December, 1895, to 30th April, 1896.

Date.	Degrees.	Date.	Degrees.	Date.	Degrees.
1895.		1896.		1896.	
Dec. 1.....	36	Jan. 20.....	10	Mar. 12.....	26
do 2.....	26	do 21.....	5	do 13.....	22
do 3.....	20	do 22.....	8	do 14.....	11
do 4.....	17	do 23.....	17	do 15.....	12
do 5.....	9	do 24.....	6	do 16.....	14
do 6.....	32	do 25.....	12	do 17.....	19
do 7.....	20	do 26.....	5	do 18.....	14
do 8.....	27	do 27.....	20	do 19.....	18
do 9.....	10	do 28.....	7	do 20.....	27
do 10.....	4	do 29.....	13	do 21.....	29
do 11.....	3	do 30.....	10	do 22.....	30
do 12.....	8	do 31.....	6	do 23.....	2
do 13.....	5	Feb. 1.....	6	do 24.....	7
do 14.....	22	do 2.....	11	do 25.....	16
do 15.....	33	do 3.....	20	do 26.....	29
do 16.....	29	do 4.....	10	do 27.....	37
do 17.....	22	do 5.....	6	do 28.....	26
do 18.....	20	do 6.....	12	do 29.....	19
do 19.....	30	do 7.....	20	do 30.....	30
do 20.....	30	do 8.....	28	do 31.....	24
do 21.....	18	do 9.....	26	April 1.....	27
do 22.....	22	do 10.....	27	do 2.....	29
do 23.....	29	do 11.....	30	do 3.....	29
do 24.....	30	do 12.....	26	do 4.....	25
do 25.....	32	do 13.....	19	do 5.....	27
do 26.....	32	do 14.....	1	do 6.....	17
do 27.....	32	do 15.....	14	do 7.....	13
do 28.....	32	do 16.....	6	do 8.....	17
do 29.....	26	do 17.....	12	do 9.....	21
do 30.....	18	do 18.....	7	do 10.....	20
do 31.....	30	do 19.....	9	do 11.....	32
1896.		do 20.....	19	do 12.....	28
Jan. 1.....	26	do 21.....	20	do 13.....	20
do 2.....	20	do 22.....	7	do 14.....	19
do 3.....	14	do 23.....	8	do 15.....	17
do 4.....	24	do 24.....	20	do 16.....	24
do 5.....	5	do 25.....	5	do 17.....	29
do 6.....	6	do 26.....	3	do 18.....	32
do 7.....	22	do 27.....	9	do 19.....	22
do 8.....	23	do 28.....	14	do 20.....	29
do 9.....	0	do 29.....	27	do 21.....	20
do 10.....	8	Mar. 1.....	29	do 22.....	26
do 11.....	4	do 2.....	34	do 23.....	27
do 12.....	30	do 3.....	36	do 24.....	21
do 13.....	30	do 4.....	31	do 25.....	21
do 14.....	28	do 5.....	30	do 26.....	24
do 15.....	26	do 6.....	29	do 27.....	27
do 16.....	5	do 7.....	24	do 28.....	29
do 17.....	4	do 8.....	27	do 29.....	28
do 18.....	4	do 9.....	33	do 30.....	29
do 19.....	9	do 10.....	21		
		do 11.....	19		

NOTE.—The black figures denote below zero.

Lowest temperature, 1895, 12th December; highest, 1st December.

do	1896, 29th January	do	12th January.
do	1896, 17th February	do	11th February.
do	1896, 24th March	do	27th March.
do	1896, 7th April	do	11th April.

Respectfully submitted.

MICHAEL COLTON, *Lightkeeper.*
H. J. McHUGH, *Superintendent.*

APPENDIX
TELEGRAPH, SEMAPHORE AND SIGNAL
RIVER AND GULF
SOUTH SHORE OF THE

Signal Stations.	Telegraph Offices.	Lighthouse.	Flag Stations.	Semaphore Station.	Marine Miles from Quebec.	Telegraph Co. working Lines.
1 L'Islet	Tel. Office		Flag.		41	Great North-western Co.
2 Rivière du Loup.	do	Lighthouse.	do		94½	do
3 Father Point.	do	do	do		157½	do
4 Little Metis.	do	do	do		176½	do
5 Matane.	do	do	do		199½	do
6 Cape Chatte.	do	do	do		233½	do
7 Martin River	do	do	do		258½	do
8 Cape Magdalen	do	do	do		291½	do
9 Fame Point.	do	do	do		320½	do
10 Cape Rosier.	do	do	do		343½	do

NORTH SHORE OF THE

11 Port Neuf	Tel. Office	Lighthouse.	Flag.		144½	Dom. Govt. and G.N.W.Co
12 Manicouagan	do		do		180	do do
13 Pointe de Monts.	do	Lighthouse.	do		205	do do

GASPÉ COAST

14 Cape Despair	Tel. Office	Lighthouse.	Flag.		372½	Great North-western Co.
15 Pointe Maquereau.	do	do	do		395½	do

COAST OF NEW

16 Point Escuminac.	Tel. Office	Lighthouse.	Flag.		450	Dom. Govt. and G.N.W.Co
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ISLAND OF

17 West Point.	Tel. Office	Lighthouse.	Flag.		323	Dom. Govt. and G.N.W.Co
18 South-west Point.	do	do	do		356½	do do
19 South Point.	do	do	do		411	do do
20 Heath Point.	do	do	do		432½	do do

MAGDALEN

21 Grosse Isle.	Tel. Office	Lighthouse.	Flag.		472½	D.Govt., W.U. & G.N.W.Co
22 Amherst Island	do	do	do		477½	do do

CAPE BRETON,

23 Meat Cove.	Tel. Office	Lighthouse.	Flag.		526½	D.Govt., W.U. & G.N.W.Co
24 Low Point.	do	do	do	Semaphore.	585	do do

ST. PAULS

25 Main Station.	Telephone	Lighthouse.	Flag.		531	D.Govt., W.U. & G.N.W.Co
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NEWFOU

26 Cape Ray	Tel. Office	Lighthouse.	Flag.		552½	D.Govt., Anglo-Amer.Cable Co., W. U. & G.N.W.Co
27 Cape Race.	do	do	do		820	do do

C.

STATIONS, MARINE DEPARTMENT, CANADA.
OF ST. LAWRENCE.
RIVER ST. LAWRENCE.

Rate per ten words and additional words.	Date when established.	Name of Agent.	Post Office.	County.	Province.	Salary per annum from Marine Dept.
25c. & 1c.	Oct. 28, '79.	Mrs. J. B. E. Fortin....	L'Islet.....	L'Islet.....	Que...	\$50
do	Nov. 16, '81.	L. T. Puize.....	Rivière du Loup (en bas).....	Temiscouata.....	do ..	50
do	Nov. 22, '79.	John McWilliams.....	Father Point.....	Rimouski.....	do ..	50
do	Nov. 17, '79.	Jules Martin.....	Little Métis.....	do ..	do ..	50
do	Nov. 5, '79.	P. Desjardins.....	Matane.....	do ..	do ..	50
do	Sept. 19, '79.	Treffé Côté.....	Cape Chatte.....	Gaspé.....	do ..	50
do	Sept. 23, '79.	Jean Gauthier.....	Martin River.....	do ..	do ..	50
do	Oct. 9, '79.	J. F. Sasseville.....	Cape Magdalen.....	do ..	do ..	50
do	Oct. 14, '80.	James Ascah.....	Fox River.....	do ..	do ..	50
do	Oct. 20, '79.	E. Costin.....	Cape Posier.....	do ..	do ..	50

RIVER ST. LAWRENCE.

40c. & 2c.	June 1, '83.	Dorelas Tremblay.....	Port Neuf (en bas).....	Saguenay.....	Que..	\$50
do	Aug. 15, '83.	A. Laussier.....	Manicouagan.....	do ..	do ..	
do	Oct. 19, '83.	V. Faffard.....	Pointe de Monts.....	do ..	do ..	50

OF THE GULF.

25c. & 1c.	June 17, '80.	James Beck.....	Cape Despair.....	Gaspé.....	Que..	\$50
do	May 22, '80.	Auguste Bertrand.....	Port Daniel.....	do ..	do ..	50

BRUNSWICK.

40c. & 2c.	July 2, '85.	K. McLennan.....	Point Escuminac.....	Northumberland	N.B..	
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ANTICOSTI.

75c. & 6c.	Oct. 1, '81.	Auguste Malouin.....	Anticosti Id. via Gaspé..	Gaspé.....	Que..	
do	Oct. 18, '80.	E. Pope.....	do ..	do ..	do ..	
do	July 27, '81.	Alphonse Nadeau.....	do ..	do ..	do ..	
do	July 20, '81.	Z. Gagné.....	do ..	do ..	do ..	

ISLANDS.

81.00 & 8c.	Aug. 17, '80.	A. Le Bourdais.....	Magdalen Id. via Pictou	Gaspé.....	Que..	
do	June 11, '81.	William Cormier.....	do N.S....	do ..	do ..	

NOVA SCOTIA.

55c. & 3c.	Nov. 7, '81.	A. R. MacDonald.....	Meat Cove, C.B.....	Victoria.....	N.S..	
30c. & 2c.	Aug. 1, '81.	J. G. Peters.....	Low Point, C.B.....	do ..	do ..	\$50

ISLAND.

80c. & 5c.	1890.....	John McLeod.....	North Sydney, C.B.....	Victoria.....	N.S..	
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NDLAND.

81.05 & 10c.	Nov. 9, '82.	E. R. Renuie.....	Cape Ray.....	Newfoundland..	Nfld..	\$50
do	1890.....	P. Myrrick.....	Cape Race.....	do ..	do ..	

H. J. McHUGH, *Supt. Signal Service.*

PORT OF HALIFAX, N.S.

PARTICULARS of Vessels Signalled during

Year or Month.	English Men-of-War. Troopships.			Foreign Men-of-War.			Steamers, 1st class.			Steamers, 2nd class.		
	Reported.	Arrived.	Passed.	Reported.	Arrived.	Passed.	Reported.	Arrived.	Passed.	Reported.	Arrived.	Passed.
July.....	3	3	0	1	1	0	16	14	2	80	80	0
August.....	2	2	0	0	0	0	16	11	5	64	64	0
September.....	6	5	1	0	0	0	17	11	6	70	70	0
October.....	2	2	0	0	0	0	13	9	4	74	74	0
November.....	1	1	0	0	0	0	20	17	3	53	53	0
December.....	1	1	0	0	0	0	19	15	4	47	45	2
January.....	0	0	0	0	0	0	15	14	1	50	49	1
February.....	0	0	0	0	0	0	19	18	1	45	43	2
March.....	0	0	0	0	0	0	22	21	1	34	34	0
April.....	1	1	0	0	0	0	35	25	10	36	36	0
May.....	4	4	0	2	2	0	18	16	2	71	68	3
June.....	3	3	0	0	0	0	11	11	0	68	62	6
Totals.....	23	22	1	3	3	0	221	182	39	692	678	14

N.B.—Besides those sailing vessels reported a large number arrived during the night of which no

SIGNAL SERVICE.

the year ending 30th June, 1896.

Ships.			Barques.			Barquentines.			Brigs.			Brigantines.			Schooners, 3-masted or wearing Private Signals.			Monthly Totals.		
Reported.	Arrived.	Passed.	Reported.	Arrived.	Passed.	Reported.	Arrived.	Passed.	Reported.	Arrived.	Passed.	Reported.	Arrived.	Passed.	Reported.	Arrived.	Passed.	Reported.	Arrived.	Passed.
0	0	0	2	3	0	1	1	0	0	0	0	7	5	2	13	10	3	124	117	7
0	0	0	3	2	1	3	1	2	0	0	0	5	4	1	9	4	5	102	88	14
1	1	0	1	1	0	3	1	2	0	0	0	7	5	2	13	11	2	118	105	13
0	0	0	0	0	0	1	1	0	0	0	0	7	7	0	9	9	0	107	108	4
0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	3	3	0	84	81	3
0	0	0	0	0	0	1	1	0	0	0	0	3	1	0	2	2	0	73	65	8
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	65	63	2
0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	65	62	3
0	0	0	3	3	0	0	0	0	0	0	0	2	2	0	2	2	0	64	63	1
0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	5	4	1	80	69	11
0	0	0	6	5	1	0	0	0	0	0	0	3	3	0	10	10	0	114	108	6
0	0	0	13	12	1	1	1	0	0	0	0	5	4	1	18	9	9	119	102	17
1	1	0	32	29	3	11	7	4	0	0	0	42	34	6	84	64	20	1,115	1,026	89

notice was taken.

H. V. KENT, Capt. R. E.,
Superintendent of Signals.

APPENDIX No. 9. LIVE STOCK SHIPMENTS.

RECORD of Live Stock shipped from Port of Montreal during season of 1896.

Number	Date.	Steamer.	Destination.	SHEEP.		Fees collected.	HORSES.		SWINE.		Grain for Feed.	Number of Men.
				Shipped.	Lost.		Shipped.	Lost.	Shipped.	Lost.		
1	1896.					\$ cts.						
1	May 2	Mongolian	Liverpool			577		49				
2	do	Pomeranian	Glasgow					*83				
3	do	Lake Winnipeg	Liverpool			411		100				
4	do	Concordia	Glasgow	833		610		2				
5	do	Merrimac	Bristol			403		65				
6	do	Montevideo	London			310						
7	May 9	Ottoman	Liverpool	2,020		338		147				
8	do	Mennon	London			572		20				
9	May 10	Sarnia	Havre			118		51				
10	do	Fremont	London		400	400						
11	May 11	State of Georgia	Newcastle.	301		329		109				
12	do	Siberian	Glasgow			230						
13	do	Lake Huron	Liverpool			406		115				
14	do	Parkmore	do			258		26				
15	May 14	Tritonia	Glasgow.	501		501		68				
16	do	Peleciana.	Manchester			422		82				
17	do	Hurons	Dunkirk			202						
18	May 15	Memphis	Bristol			677		20				
19	do	Numidian	Liverpool			238		105				
20	do	Assaye	London			529		86				
21	do	Bellona.	Dunkirk			351		42				
22	do	Grecian	Glasgow			464		10				
23	May 20	Canadian	London			444		62				
24	do	Barrowmore	Liverpool			397		184				
25	May 21	Anarchythia	Glasgow			510		63				
26	do	Etolia	Bristol			405		9				
27	do					390						
28	do											
29	do											
30	do											

28	do	23.	Angloman	Liverpool	866	12.99	84	...	...	...
29	do	24.	Brazilian	London	324	4.86	292	...	...	...
30	do	25.	Surinamian	Glasgow	403	6.05	90	...	...	...
31	do	27.	Lake Superior	Liverpool	570	8.56	30	...	...	...
32	do	28.	Escalona	Newcastle	220	4.05	...	...	...	...
33	...	...	Aleides	Glasgow	419	9.35	40	...	...	...
34	May	29.	Lycia	Bristol	290	4.35	...	...	...	...
35	do	30.	Avlona	Dunkirk	351	5.27	...	...	...	...
36	do	...	Laurentian	Liverpool	353	5.00	37	...	...	...
37	...	...	Scotsman	do	366	13.00	128	...	...	...
...	...	...	Gerona	London	242	3.63	116	...	...	...
37	May, 1895	...	...	...	14,827	252.00	2,184	...	...	646
44	do 1894	...	...	...	15,887	521.11	1,997	...	...	...
33	do 1893	...	...	...	14,341	523.33	982	...	...	...
41	do 1892	...	...	...	15,336	306.72	296	...	...	...
...	...	...	...	...	16,711	334.22	511	...	...	...

* Vancouver. † Labrador.

38	June	2.	Scandinavian	Glasgow	436	6.54	101	...	...	...
39	do	3.	Orniston	London	296	4.44	233	2	...	...
40	do	4.	Mayumba	do	230	3.45	...	...	...	...
41	do	4.	Warwick	Glasgow	413	8.75	25	...	...	...
42	do	6.	Mongolian	Liverpool	298	4.47	102	...	...	...
43	...	...	Loango	Bristol	351	5.37	...	...	...	...
44	do	7.	Lake Winnipeg	Liverpool	512	7.08	58	...	...	...
45	do	10.	Pomeranian	Glasgow	449	6.74	152	1	...	...
46	do	11.	Concordia	do	431	8.98	10	...	...	...
47	...	...	Merrimac	Bristol	311	4.80	...	...	...	...
48	do •	13.	Ottoman	Liverpool	934	14.01	74	...	...	...
49	do	14.	Iona	London	521	7.82	48	...	...	...
50	...	...	Parkmore	Liverpool	524	7.86	136	...	...	...
51	...	...	Montevidean	London	413	6.20	77	...	...	...
52	...	...	Dunmere Head	Belfast	...	...	41	...	...	...
...	...	...	...	...	...	...	*30	...	...	...
53	do	15.	Montezuman	London	415	6.23	458	5	...	...
54	do	16.	Siberian	Glasgow	465	6.98	88	1	...	...
55	do	17.	Lake Huron	Liverpool	400	6.00	56	1	...	...
56	...	...	Oregon	Dunkirk	377	5.66	...	...	...	...
57	do	18.	Tritonia	Glasgow	421	10.32	81	...	...	...
58	do	19.	Memphis	Bristol	326	4.89	...	...	...	...
59	do	20.	Barrowmore	Liverpool	597	8.96	63	...	...	...
60	...	...	Numidian	do	300	4.50	106	...	...	...
61	do	21.	State of Georgia	Newcastle	239	5.71	140	...	...	...
62	do	23.	Grecian	Glasgow	424	6.36	58	...	...	...
66	...	...	Memnon	London	321	4.82	41	...	...	...

RECORD OF LIVE STOCK SHIPPED FROM PORT OF MONTREAL DURING SEASON OF 1896.

[illegible]

[illegible]

*Took 339 cattle at Quebec, sent down from Montreal, ship drawing too much water. †345 cattle and 149 sheep sent to Quebec to go on there, on account of draught of ship. ‡Total sent to Quebec, 684 cattle, 149 sheep.

Record of Live Stock shipped from Port of Montreal during season of 1896.

Number.	Date.	Steamer.	Destination.	SHEEP.		CATTLE.			HORSES.		Hay for Feed.	Grain for Feed.	Number of Men.	
				Shipped.	Lost.	Fat.	Stocks.	Total.	Lost.	Shipped.				Lost.
1896.														
113	Aug. 1.	Angloman.	Liverpool.	518	4			934					16 66	
114	do 2.	Felecia.	Manchester.	378	1			348					7 11	
115	do 2.	Canadian.	London.	1,106	2			897	2	1			11 49	
116	do 2.	Monmon.	Bristol.	131	1			272					7 74	
117	do 3.	State of Georgia.	Newcastle.	431				240					5 76	
118	do 4.	Sarnatan.	Glasgow.	285				415					7 71	
119	do 4.	Fishmen Head.	Dublin.										25	
120	do 5.	Lake Superior.	Liverpool.	295	2			386					7 27	
121	do 6.	Aleides.	Glasgow.	834				432		31			10 75	
122	do 7.	Hurona.	London.					584		42			8 76	
123	do 8.	Vancouver.	Liverpool.										105	
124	do 8.	Laurentian.	do	72									12 39	
125	do 8.	Lycia.	Bristol.	535	2			248	1				6 40	
126	do 9.	Bellona.	Havre.	616				443	3				9 73	
127	do 10.	Brazilian.	London.	1,154	5			379		35			11 46	
128	do 10.	Assaye.	do	1,278	5			398		40			12 36	
129	do 11.	Scandinavian.	Glasgow.	757	2			442	3	76			10 42	
130	do 12.	Lake Winnipeg.	Hope.	100	2			608	1	9 02			1	
131	do 13.	Warwick.	Glasgow.	464	2			449	1				9 06	
132	do 14.	Scotsman.	Liverpool.					650		9 75			22	
133	do 15.	Mongolian.	do	562	1			562		11 24			29	
134	do 15.	Fremona.	London.	197	1			430		7 44				
135	do 16.	Oregon.	Dunkirk.	569	+			114	+	4 71				
136	do 16.	Ormskton.	London.	330	6			456	1				8 49	
137	do 16.	Queensmore.	do	939				707		15 31			57	
138	do 17.	Atolia.	Bristol.	117				232		4 07				
139	do 18.	Pomeranian.	Glasgow.	677				550		11 64			36	
140	do 19.	Lake Ontario.	Liverpool.	247				282		5 47			46	
141	do 20.	Rossmore.	do			643	80	723		10 85				
142	do 21.	Escalona.	Newcastle.	178				286		4 88				
143	do 22.	Ottoman.	Liverpool.	523				521		10 47			40	
144	do 22.	Memorial.	Bristol.	324				365		6 95				
145	do 23.	Key.	London.					190		2 85				
146	do 25.	Suburban.	Glasgow.	147				422		7 13			20	

RECORD of Live Stock shipped from Port of Montreal during season of 1896.

Number.	Date.	Steamer.	Destination.	SHEEP.		CATTLE.			HORSES.		SWINE.		Grain for Feed.	Number of Men.
				Shipped.	Lost.	Pat.	Stockers.	Total.	Lost.	Fees collected.		Shipped.	Lost.	
	1895.									\$	cts.		Lbs.	
178	Sept. 19.	Mongolian	Liverpool	.....	.....	.....	.....	202	1	3 03	.....	33	.....	.....
179	.....	Scotsman	do	.....	.....	.....	10	226	1	3 30	.....	47	.....	.....
180	Sept. 20.	Assaye	London.	1,483	.....	.....	.....	251	.....	11 19	.....	71	.....	.....
181	.....	Ormistoun	do	949	.....	.....	.....	142	.....	7 13	.....	.....	.....	.....
182	.....	Rossmore.	Liverpool	.....	.....	.....	.....	838	.....	12 57	.....	.....	.....	.....
183	.....	Iona.	London.	653	.....	.....	.....	233	.....	6 82	.....	155	.....	.....
184	Sept. 23.	Pomeranian	Glasgow	.....	.....	.....	10	427	.....	6 41	.....	55	.....	.....
185	.....	Carlisle City.	Liverpool	.....	.....	.....	20	278	.....	6 79	.....	54	.....	.....
186	Sept. 24.	Concordia	Glasgow	523	.....	.....	.....	241	.....	3 62	.....	.....	.....	.....
187	.....	Fremona	London.	.....	.....	.....	.....	452	.....	6 78	.....	.....	.....	.....
188	Sept. 25.	Parkmore.	Liverpool	809	.....	.....	.....	606	.....	13 09	.....	168	.....	.....
189	.....	Queensmore.	London.	574	.....	.....	.....	5	.....	2 90	.....	26	.....	.....
190	Sept. 26.	Otoman.	Liverpool	.....	.....	.....	.....	377	.....	5 66	.....	.....	.....	.....
191	do 27.	Merrimac.	Bristol	.....	.....	.....	.....	344	.....	5 24	.....	.....	.....	.....
192	do 29.	Ganges.	Newcastle	.....	.....	.....	30	221	.....	3 32	.....	.....	.....	.....
193	do	Siberian.	Glasgow	.....	.....	.....	.....	425	.....	6 38	.....	22	.....	.....
194	do 30.	Lake Huron.	Liverpool	.....	.....	.....	.....	133	.....	2 00	.....	46	.....	.....
		Total for September, 1896.	.....	16,396	.....	12,288	275	12,563	.....	265 40	.....	1,003	.....	609
		Reported August 31, 1896.	.....	41,393	214	61,522	990	62,512	105	1,145 24	.....	7,256	25	2,801
	Sept. 30.	Total for the season	.....	56,789	.....	73,810	1,265	75,075	.....	1,410 73	.....	8,868	.....	.....
188	.....	Same date, 1895.	.....	112,165	524	73,620	2,255	75,870	120	3,397 90	.....	9,832	.....	.....
189	.....	do 1894.	.....	90,703	678	.....	.....	69,890	69	3,004 11	.....	8,988	.....	.....
191	.....	do 1893.	.....	905	.....	.....	.....	70,540	115	1,896 13	.....	1,310	.....	.....
214	.....	do 1892.	.....	15,967	.....	.....	.....	86,877	117	1,737 54	.....	1,505	.....	.....

*150 cattle sent from here to go on at Quebec. †176 cattle and 160 sheep sent to Quebec to go on there. ‡250 cattle, 1,411 sheep and 88 horses sent to Quebec.
 †570 cattle, 1,571 sheep and 88 horses sent by rail to Quebec. ‡1,483 cattle and 149 sheep sent by rail to Quebec. ¶12,050 cattle, 1,720 sheep and 88 horses sent by rail to Quebec to go on there. These numbers are not taken into account in our reports.

Record of Live Stock Shipped from Port of Montreal during season of 1896.

Number.	Date.	Steamer.	Destination.	SHEEP.			CATTLE.			HORSES.		Hay for Feed.	Grain for Feed.	Number of Men.
				Shipped.	Lost.	Fat.	Stockers.	Total.	Lost.	Shipped.	Lost.			
241	1896.	Merrimac	Bristol	226				386						
242		Iona	London					495						
		a Shipped in October		13,323		12,248	156	12,404		1,175				598
		b Reported September 30, 1896.		56,789	340	73,810	1,265	75,075	167	8,838	71			3,410
		c Total to date, 1896.		70,112		86,058	1,421	87,479		10,033				4,008
		Same date, 1895.		171,252				88,460		11,896				
		do 1894.		119,341				79,390		5,065				
		do 1893.		1,781				80,495		2,193				
		do 1892.		15,914				95,192		1,903				

* 373 sheep and 47 cattle went on board at Quebec. + 1,663 sheep and 243 cattle went on board at Quebec. † 574 cattle went on board at Quebec.
 ‡ 618 cattle sent to Quebec. a 2,036 sheep and 1,482 cattle sent to Quebec. b 1,720 sheep, 2,063 cattle and 88 horses sent to Quebec. c 3,756 sheep, 3,541 cattle and 88 horses sent to Quebec.

243	Nov. 3.	Hibernian	Glasgow	165				333		5 00	21			
244	do 4.	Lake Huron	Liverpool	647				280		5 03				
245	do 5.	Barrowmore	do					530		11 19	2			
246	do 6.	Memphis	Bristol					350		5 25				
247	do 7.	Krenona	London					461		6 92	1			
248		Numidian	Liverpool					267		3 11	7			
249		Labrador	do					254		3 81	40			
250	Nov. 8.	Anarynthia	Glasgow	890				738		15 52	15			
251	do 9.	Queensmore	London	523				175		5 25				
252	do 11.	Montreal	do					500		7 50				
253		Anglonian	Liverpool					15		3 74				
254	Nov. 12.	Lake Superior	do	306				249		4 43				
255	Nov. 12.	Manitoba	Glasgow					295		3 18	15			
256	do 13.	Aleides	do					212		3 18				
257		Lycia	Bristol	288				198		4 41				

[illegible]

* And 200 cattle sent to Quebec. The 3,756 sheep, 3,741 cattle, 88 horses which went to Quebec and were put on board there have not been included in these figures. No returns of lost at sea received for November as yet.

POPE and MORGAN,
Inspectors.

Montreal, November 23rd, 1896.

11-11

Record of Live Stock shipped from Port of Halifax during month of June, 1896.

Number.	Date.	Steamer.	Destination.	SHEEP.			CATTLE.			HORSES.		SWINE.		Hay, for Feed.	Grain, for Feed.	Number Men.
				Shipped.	Lost.	Pat.	Stockers.	Total.	Lost.	Shipped.	Lost.	Shipped.	Lost.			
	1896.															
1	June 27	St. John City.	London.													
2	Dec. 19	Numidian	Liverpool							+21						

* 1 roan horse owned by Col. Shannon. Certificate from Mr. Jakeman, V.S., produced. Horse marked V.R. with red paint.

+ The horses were inspected by Mr. Jakeman, V.S., and marked V.R. with paint.

DAVID HUNTER,
Port Warden.

LIVE STOCK SHIPMENTS.

163

Record of Live Stock shipped from Port of St. John.

Number.	Date.	Steamer.	Destination.	SHEEP.		CATTLE.				HORSES.		SWINE.		Hay for Feed.	Grain for Feed.	Number of Men.
				Shipped.	Lost.	Fat.	Stockers.	Total.	Lost.	Shipped.	Lost.	Shipped.	Lost.			
1895.																
1	Dec. 12.	Lake Superior	Liverpool	1,843	*31									Lbs.	Lbs.	*8
2	do 28.	Lake Ontario	do	542	*3	75			*1	75	*1			52 000	12 000	3
3	do 30.	Concordia	Glasgow	431	+31	302			+18	28				29 250	11 710	+14
	Total			2,816	65			377	19	169	1			80 000	40 000	25
1896.																
4	Jan. 9.	Lake Winnipeg	Liverpool	40		125										5
5	do 20.	Warwick	Glasgow	137	*7	248				12				29 705	11 880	*13
6	do 23.	Lake Superior	Liverpool			164				20				62 970	23 820	6
7	do 31.	Lake Ontario	do	883	+17	107			+9	188	+4			34 750	14 680	+9
	Total			1,060	24			644	9	220	4			45 000	20 000	33
8	Feb. 8.	Concordia	Glasgow			226			*2					172 425	70 330	9
9	do 13.	Oregon	London											54 240	14 000	15
10	do 20.	Lake Winnipeg	Liverpool	18		384			*1	72				97 000	20 000	24
11	do 25.	Sarnia	London							108						16
	Total			18				610	3	198				157 240	34 000	24
12	Mar. 5.	Lake Huron	Liverpool			445										*18
13	do 8.	Warwick	Glasgow	602	*4	340			*1	17	*1			90 125	40 050	*16
14	do 11.	Lake Ontario	Liverpool	636	*10	200			*1	108				98 000	24 600	*11
15	do 18.	Lake Superior	do	419	*4	331			*1	91				65 000	17 000	*15
16	do 26.	Concordia	Glasgow	1,602	+73	340			+1	18	+2			83 925	33 570	+19
	Total			3,279				1,656		314				132 120	46 400	79
														469 170	161 620	79
17	April 2.	Lake Winnipeg	Liverpool	125		438				35				101 200	40 646	18
18	do 9.	Lake Huron	do	499		275				48				60 750	26 000	14

RECORD of Live Stock shipped from Port of St. John—Concluded.

Number.	Date.	Steamer.	Destination.	SHEEP.			CATTLE.			Fees Collected.	HORSES.		SWINE.		Hay for Feed.	Grain for Feed.	Number of Men.
				Shipped.	Lost.		Pat.	Stockers.	Total.	Lost.	Shipped.	Lost.	Shipped.	Lost.			
	1896.									\$ cts.					Lbs.	Lbs.	
19	April 15.	Lake Ontario.	Liverpool	.....	.....	.....	385	.....	.....	11 55	38	.....	.....	.....	85 875	34 650	15
20	do 16.	Warwick.	Glasgow	.....	.....	.....	315	.....	.....	15 44	68	.....	.....	.....	96 000	33 200	15
21	do 16.	Oregon.	London.	.....	.....	.....	.....	.....	.....	.....	51	.....	.....	.....	.....	.....	.....
22	do 23.	Lake Superior	Liverpool	.....	.....	.....	346	.....	.....	15 34	30	.....	.....	.....	85 650	34 640	15
	Total			1,719	.....	.....	.....	.....	1,759	69 96	270	.....	.....	.....	429 475	169 136	77

* Died at sea. † Died at sea, heavy storm. ‡ No returns of losses for the month of April yet.

TOTAL number of sheep, cattle and horses shipped to the United Kingdom from Montreal, Quebec, St. John and Halifax during the season of 1896, and from St. John during December, 1895.

	Sheep.	Cattle.	Horses.
Montreal.....	76,112	96,448	10,421 •
Quebec.....	3,756	3,741	88
St. John.....	8,892	5,046	11,071
Halifax.....	.....	.....	22
Total.....	88,700	105,235	21,602

APPENDIX No. 10.

STATEMENT relating to the Wharfs under the control of the Department, on
30th June, 1896.

Locality.	Wharfinger.	Date of Appointment of Wharfinger.	Remuneration Allowed.	Amount deposited to credit of Receiver General.
<i>Ontario.</i>				\$ cts.
Cockburn Island.....	Alfred Monck	May 30, 1889.	25 p.c. of collections.....	67 70
Goderich.....	W. Marlton.....	Feb. 14, 1894.	25 do	267 09
Kingsville.....	A. E. Malott.....	Nov. 6, 1895.	25 do	21 91
Morpeth.....	C. Stammers.....	Aug. 1, 1894.	25 do	45 67
Rondeau.....	W. R. Fellowes.....	Dec. 17, 1888.	25 do	59 97
Sault Ste. Marie.....	Vacant.....		\$100 per annum do	
Southampton.....	Geo. McVittie.....	Aug. 16, 1895.	25 p.c. of collections.....	34 81
Sumnerstown.....	Under lease.....			
Thessalon, Algoma.....	Sam'l Hazen.....	May 13, 1896.	25 p.c. of collections.....	
Wiarton.....	H. R. A. Ely.....	Dec. 10, 1890.	25 do	88 99
				586 14
<i>Quebec.</i>				
Agnes.....	L. A. Roy.....	Nov. 27, 1891.	25 p.c. of collections.....	7 92
Anse St. John.....	F. Lavoie.....	Mar. 13, 1895.	25 do	120 32
Baie St. Paul.....	Vacant.....		25 do	
Baie St. Paul, Isolated Block.	A. Simard.....	Aug. 25, 1891.	25 do	176 76
Beauport.....	H. Grenier.....	July 1, 1895.	25 do	
Berthier.....	Jos. Bouffard.....	April 26, 1895.	25 do	56 03
Carleton.....	Jos. Cauchon.....	June 4, 1889.	\$50 per annum.....	64 14
Cascades.....	Nérée Moreau.....	Aug. 20, 1892.	25 p.c. of collections.....	
Chicoutimi.....	Juste Ouellette.....	May 2, 1893.	25 do	193 75
Echo Vale, Lake Megantic.....	D. P. Matheson.....	May 16, 1894.	25 do	16 00
Grand River.....	John Carberry.....	Sept. 23, 1892.	25 do	161 43
Isle aux Grues.....	Jos. Painchaud.....	Feb. 17, 1890.	25 do	1 27
Lacolle.....	R. J. Robinson.....	Mar. 8, 1894.	25 do	19 29
Les Eboulements.....	M. Tremblay.....	Sept. 4, 1894.	25 do	59 00
L'Islet.....	Octave Morin.....	Feb. 3, 1893.	25 do	
Longueuil.....	D. Brissette.....	Mar. 23, 1893.	25 do	47 21
Magog.....	David Pippin.....	June 12, 1896.	25 do	
Matane.....	E. Chouinard.....	July 2, 1895.	25 do	
Murray Bay.....	Elie Maltais.....	Aug. 15, 1893.	25 do	146 79
New Carlisle.....	John C. Hall.....	June 4, 1889.	25 do	165 24
Perce.....	T. W. Flynn.....	Jan. 19, 1893.	25 do	32 28
Port Daniel.....	John Enright.....	Sept. 11, 1890.	\$50 per annum.....	70 24
Rimouski.....	Chas. Lepage.....	July 24, 1894.	25 p.c. of collections.....	
Rivière Ouelle.....	J. H. dit Beaulieu.....	Nov. 28, 1892.	25 do	1 61
Rivière du Loup.....	Louis Pinze.....	Sept. 16, 1891.	25 do	183 83
St. Alphonse de Bagotville.....	Abel Tremblay.....	July 7, 1891.	25 do	310 73
St. Jean d'Orléans.....	Chas. Langlois.....	Dec. 16, 1892.	25 do	65 50
Ste. Cécile du Bic.....	L. N. Cote.....	July 20, 1891.	25 do	177 86
St. Laurent d'Orléans.....	Ed. Chabot.....	Aug. 25, 1894.	25 do	40 27
Tadousac.....	L. N. Catellier.....	July 20, 1895.	25 do	150 94
Trois Pistoles.....	D. Damour.....	May 10, 1895.	25 do	
St. Thomas de Montmagny.....	T. Gendreau.....	Nov. 9, 1894.	25 do	8 28
				2,281 69

* Commission on collections not to exceed \$200 per annum.

STATEMENT relating to Wharfs, &c.—Continued.

Locality.	Wharfinger.	Date of Appointment of Wharfinger.	Remuneration Allowed.	Amount deposited to credit of Receiver General.
<i>Nova Scotia.</i>				\$ cts.
Arisaig.....	John McInnis	Aug. 27, 1892.	25 p. c. of collections...	
Avonport.....	Robert Shaw	Nov. 23, 1888.	25 do	
Barrington.....	S. W. Crowell	Aug. 12, 1891.	25 do	169 25
Bayfield.....	W. McDonald	Oct. 30, 1894.	25 do	42 62
Belliveau's Cove.....	St. Clair Thériau.....	Nov. 24, 1892.	25 do	186 33
Broad Cove.....	John Teal	June 12, 1893.	25 do	
Broad Cove Marsh.....	Hugh McDonald.....	Oct. 19, 1892.	25 do	
Brooklyn.....	F. T. Gardiner.....	do 20, 1882.	20 do	
Canada Creek.....	C. E. Eaton	Nov. 23, 1888.	25 do	
Cape Cove.....	M. A. Doucette.....	Dec. 7, 1891.	25 do	15 37
Centreville.....	W. M. B. Dakin.....	Aug. 25, 1888.	25 do	76 30
Chipman's Brook.....	Jas. Misaner.....	Nov. 23, 1888.	25 do	
Church Point.....	Chas. F. Belliveau.....	Aug. 20, 1892.	25 do	49 19
Cow Bay.....	Arch. McKinnon.....	Apr. 15, 1879.	7½ do	435 76
Cranberry Head.....	Abram Thurston.....	Feb. 16, 1889.	25 do	
Crabbens Pier.....	A. R. Boyd.....	Oct. 2, 1895.	25 do	
Delap's Cove.....	R. W. McColl.....	Nov. 28, 1889.	25 do	
Digby.....	H. B. Short.....	Jan. 9, 1891.	25 do	1,137 06
Eagle Head.....	Nathan Leslie.....	do 9, 1889.	25 do	
East Bay.....	Donald McInnis (Ronald's son).....	Apr. 5, 1886.	50 do	
East River, Sheet Harbour.....	Malcolm McFarlane.....	May, 20, 1890.	25 do	
Grand Narrows, Victoria Co.....	Vacant.....		25 do	
Grand Narrows, Cape Breton Co.....	E. A. McNeill.....	Nov. 6, 1888.	25 do	
Hall's Harbour.....	Sydney Roscoe.....	do 23, 1888.	25 do	
Hampton.....	Judson Foster.....	Aug. 25, 1888.	25 do	55 98
Harbourville.....	F. Morris.....	June 8, 1894.	25 do	31 12
Irish Cove.....	Colin Cash.....	do 28, 1895.	25 do	31 20
Lismore.....	D. A. McKinnon.....	July 5, 1895.	25 do	
Maitland, Hants Co.....	W. B. Smith.....	June 8, 1894.	25 do	
Maitland, Yarmouth Co.....	J. N. Sanders.....	Sept. 20, 1894.	25 do	31 20
Margaretsville.....	T. J. Downie.....	Aug. 25, 1888.	25 do	57 78
Metegan Cove.....	H. F. Deveau.....	Sept. 15, 1888.	20 do	79 24
Metegan River.....	Urbain Doucette.....	Jan. 3, 1883.	25 do	114 33
Militia Point.....	D. McIntosh.....	Aug. 20, 1892.	25 do	
Morden.....	John Redgate.....	Nov. 16, 1895.	25 do	12 21
Ogilvie.....	M. Donnellan.....	July 13, 1893.	25 do	25 65
Parrsboro'.....	Thompson Tipping.....	do 26, 1888.	25 do	49 13
Pickett's Wharf.....	Andrew Bishop.....	Dec. 24, 1884.	25 do	
Plympton.....	Wm. Smith.....	Aug. 8, 1890.	25 do	
Point Brulé.....	David Stevenson.....	Nov. 23, 1888.	25 do	
Port George.....	W. Crawford.....	June 7, 1894.	25 do	137 48
Port Hood.....	A. V. McDougald.....	May 17, 1892.	25 do	133 29
Port Lorne.....	Samuel Beardsley.....	Aug. 25, 1888.	25 do	50 95
Salmon River.....	J. M. Deveau.....	Nov. 25, 1890.	25 do	
Saulniersville.....	John T. Saulnier.....	Aug. 25, 1888.	25 do	43 17
Tancook Island.....	Amos Hubley.....	Oct. 28, 1893.	25 do	
Tracadie.....	J. M. Hall.....	Nov. 6, 1888.	25 do	
Tusket Wedge.....	Jas. Cothreau.....	Feb. 16, 1889.	25 do	
Victoria.....	William Brown.....	do 11, 1889.	25 do	8 65
Wallace.....	Don McKenzie.....	Dec. 16, 1892.	25 do	
West Pubnico.....	W. H. D'Entremont.....	Sept. 20, 1893.	25 do	
West River, Sheet Harbour.....	Malcolm McFarlane.....	do 3, 1889.	25 do	
White Point.....	Elisha West.....	Jan. 9, 1889.	25 do	
				3,173 29
<i>New Brunswick.</i>				
Buctouche.....	J. J. LeBlanc.....	May 2, 1892.	25 do	13 99
Campbellton.....	Alfred J. Venner.....	June 10, 1893.	25 do	303 04
Cape Tormentine.....	W. B. Welsh.....	Apr. 28, 1894.	25 do	303 78
Clifton, Stonehaven.....	S. Paynes.....	Nov. 9, 1894.	25 do	20 44
Dalhousie.....	W. J. Smith.....	June 27, 1891.	25 do	140 74

STATEMENT relating to Wharfs, &c.—Concluded.

Locality.	Wharfinger.	Date of Appointment of Wharfinger.	Remuneration Allowed.	Amount deposited to credit of Receiver General.
<i>New Brunswick—Concluded.</i>				\$ cts.
Edgett's Landing.....	Thos. Barnett.....	July 5, 1895.	25 p.c. of collections ..	66 76
Hopewell Cape.....	Wm. Hamilton.....	Apr. 9, 1890.	25 do	60 21
Quaco.....	W. H. Rourke.....	July 15, 1892.	25 do	
St. Louis.....	C. Frigand.....	Oct. 29, 1895.	25 do	
				908 96
<i>Prince Edward Island.</i>				
Annandale.....	James Taylor.....	July 2, 1885.	25 do	
Bay View.....	Joseph Harrington.....	Oct. 2, 1885.	25 do	8 30
Belfast.....	Thos. McLennan.....	July 21, 1890.	25 do	84 89
Brush Wharf.....	Levi R. Ings.....	Sept. 18, 1885.	25 do	121 62
Campbell's Cove.....	Angus McIntyre.....	Oct. 17, 1888.	25 do	
Chapel Point.....	Ronald McCormack.....	Sept. 18, 1885.	25 do	9 28
China Point.....	W. S. N. Crane.....	do 18, 1885.	25 do	
Clifton.....	Wm. McKay.....	do 22, 1886.	25 do	
Crapaud and Victoria Pier.....	James Dea.....	May 12, 1890.	25 do	87 88
Georgetown.....	James Burke.....	July 2, 1885.	25 do	16 91
Hickey's Wharf.....	R. Webster.....	do 31, 1891.	25 do	12 00
Higgin's Shore.....	G. G. Henry.....	Nov. 9, 1891.	25 do	
Hurd's Point.....	R. Robblee.....	Oct. 6, 1888.	25 do	16 39
Kier's Shore.....	W. Hodgson.....	June 10, 1895.	25 do	58 90
Lambert.....	Angus McQueen.....	Oct. 24, 1891.	25 do	59 63
Lewis Point.....	David Lewis.....	June 10, 1895.	25 do	71 58
McTee's Island.....	Norman Gallant.....	Nov. 9, 1891.	25 do	
Mink River.....	B. Clow.....	June 30, 1892.	25 do	
Murray Harbour, South.....	J. McKinnon.....	Jan. 27, 1896.	25 do	
Nine Mile Creek.....	Edward Harrington.....	Oct. 29, 1885.	25 do	
North Cardigan.....	Donald McIntyre.....	July 2, 1885.	25 do	29 39
Pinette.....	Alex. Young.....	June 15, 1896.	25 do	
Pownal.....	Alex. McRea.....	Oct. 2, 1885.	25 do	57 03
St. Mary's Bay.....	Benj. Lewellin.....	Ap'l. 22, 1893.	25 do	18 18
South Rustico, Oyster Bed Bridge.....	D. Gallant.....	Feby 23, 1895.	25 do	22 84
Stevens and Montague.....	Angus McQueen.....	Oct. 24, 1891.	25 do	
Sturgeon River.....	Beaard Kearney.....	Sept. 18, 1885.	25 do	24 95
Tignish River.....	Geo. Conroy.....	Oct. 2, 1891.	25 do	54 46
Vernon River.....	J. G. McKenzie.....	do 19, 1885.	25 do	77 26
Wood Island.....	M. H. McMillan.....	May 16, 1889.	25 do	15 67
				847 16

RECAPITULATION.

	\$ cts.
Ontario.....	586 14
Quebec.....	2,281 69
Nova Scotia.....	3,173 29
New Brunswick.....	908 96
Prince Edward Island.....	847 16

Total wharfage dues collected 7,797 24

ADD—Fees received by undermentioned harbour masters in excess of remuneration allowed:—

Harbour Master—Fort William, Ont.....	\$16 50
do Port Arthur.....	6 00
do St. John's, Que.....	95 00
do Vancouver, B.C.....	23 50
	146 00

Total Revenue from Wharfs and Harbours 7,943 24

APPENDIX

STATEMENT of Expenditure by the Marine Department

	1868.	1869.	1870.	1871.	1872.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Maintenance of lights--					
Above Montreal.....	40,561 28	42,306 69	46,289 05	44,054 01	57,609 16
Montreal District.....	23,053 56	25,762 54	21,699 49	22,453 52	22,369 00
Below Quebec.....	45,615 65	41,651 73	43,730 61	31,582 75	41,936 00
Nova Scotia.....	46,460 72	56,394 88	43,682 86	76,230 77	67,862 24
New Brunswick.....	20,488 00	23,893 00	27,485 14	20,542 29	23,369 12
Prince Edward Island.....					
British Columbia.....					
Construction--					
Above Montreal.....	3,136 15		2,976 83	8,770 55	6,940 45
Quebec.....	7,323 75	7,492 59	1,543 06		57,818 35
Nova Scotia.....	22,041 42	6,905 80	18,967 23	10,948 31	34,760 12
New Brunswick.....			11,655 91	8,735 73	9,561 14
Prince Edward Island.....					
British Columbia.....					
Dominion steamers--					
Quebec.....	69,026 73	37,176 02	34,549 49	59,797 05	47,500 00
Nova Scotia.....	14,778 92	26,603 94	19,759 96	13,139 86	20,999 63
New Brunswick.....					
Prince Edward Island.....					
British Columbia.....					12,115 96
Examinations of masters and mates			908 12	1,407 66	4,312 07
Hudson's Bay expedition.....					
Investigations into wrecks.....			140 00		874 00
Marine Hospital, Quebec.....	19,977 36	19,221 45	21,618 73	19,823 18	21,000 00
Marine Hospitals.....	1,070 86	15,615 71	15,652 62	15,728 93	23,536 16
Meteorological Service.....	8,200 00	8,950 00	8,950 00	9,379 82	12,618 15
Registration of Canadian shipping.....					
Removal of obstructions.....			2,350 07	1,000 00	
Rewards for saving life.....					2,284 32
Signal Service.....					
Steamboat inspection.....	7,106 93	7,999 00	7,396 96	8,321 00	8,500 00
Survey, Georgian Bay.....					
Water Police, Montreal.....	27,445 35	10,238 71	9,423 31	8,030 00	10,000 00
do Quebec.....		12,623 59	9,038 62	9,370 73	10,348 00
Civil Government.....	15,083 88	18,064 25	19,401 05	20,220 96	22,644 52
Steam communication--					
Between Quebec and Maritime Provinces.....					
Between Prince Edward Island and Mainland.....					
Purchase of steamer to replace--					
"Glendon".....					
"Lady Head".....					
Winter Mail Service, P.E.I.....					
Tidal observations.....					
Gratuities.....					
Survey, Burrard Inlet.....					
Export cattle trade.....					
	371,070 56	360,899 90	367,129 11	389,537 12	518,958 49

No. II.

from Confederation to 30th June, 1896.

1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
61,036 47	60,798 75	71,987 18	68,344 18	65,421 00	73,175 11	74,587 78	65,518 61	67,541 21
31,143 14	20,939 13	15,000 00	12,999 48	15,998 00	15,996 09	14,917 95	16,523 88	14,326 36
65,545 00	102,056 09	110,362 00	98,792 93	89,980 41	96,904 00	93,178 61	96,703 87	89,781 29
100,953 80	114,711 91	114,344 51	143,125 56	128,496 00	132,888 95	120,951 33	116,189 60	128,918 59
29,266 85	53,439 04	60,119 02	62,551 61	50,998 00	58,989 00	57,499 02	61,252 82	63,921 90
.....	3,357 71	12,584 64	13,730 53	11,817 00	16,986 66	12,158 72	15,288 17	12,997 33
13,297 09	18,519 50	15,983 72	17,175 97	15,853 00	18,948 78	15,152 73	15,576 99	17,570 72
18,999 38	24,461 86	14,286 65	13,320 40	16,267 98	7,207 90	11,993 75	13,297 81	14,180 02
39,303 87	41,950 82	19,325 00	24,336 47	12,945 29	12,776 47	4,154 58	7,797 75	7,539 76
90,181 79	51,867 94	43,898 63	42,214 55	25,560 00	13,500 00	17,386 97	7,069 01	7,758 36
16,691 06	31,572 60	8,842 97	17,819 85	7,083 82	12,028 13	22,598 14	4,985 53	4,578 52
.....	.....	.....	11,829 61	17,752 00	2,504 47	2,560 88	6,074 60	8,150 05
.....	4,353 93	8,799 07	8,477 67	29 66	.....	.....	.....	8,645 39
51,758 05	64,490 00	79,043 70	62,971 49	49,987 66	42,683 00	44,972 79	49,318 93	64,973 00
24,999 57	30,008 99	22,992 62	133,826 08	38,839 39	43,027 00	42,016 53	32,574 64	34,700 60
.....	.....	.....	16,241 26	61,782 63	28,933 63	16,333 05	14,429 52	15,139 95
15,984 72	10,555 67	41,796 74	19,156 56	16,095 90	12,193 40	8,460 68	9,733 34	11,788 09
6,466 18	4,520 19	5,696 62	4,672 08	4,050 00	4,249 76	4,250 12	4,253 43	3,888 41
1,068 89	2,313 51	366 00	466 41	342 65	500 00	1,691 00	676 73	310 48
21,000 00	20,456 45	21,994 75	23,795 85	19,965 97	19,987 50	20,791 77	12,991 22	19,964 33
27,150 43	45,986 87	37,111 67	37,155 72	42,449 55	37,487 10	37,445 57	35,040 00	32,218 94
18,830 54	36,760 59	33,580 00	45,560 03	44,871 38	46,050 24	45,706 13	45,554 51	46,163 54
.....	272 30	1,096 46	412 06	842 14	1,435 10	239 26	257 75	607 43
.....	450 00	.....	.....	293 00	462 00	305 86	825 00	150 00
1,975 13	4,931 78	3,552 86	2,292 20	1,958 55	4,071 00	2,833 10	2,263 15	1,806 13
13,266 00	1,000 00	.....	.....	.....	.....	.....	.....	.....
.....	10,291 58	12,200 00	13,081 86	13,073 01	13,228 38	13,076 46	11,854 34	12,211 65
14,453 87	12,370 86	13,395 00	14,090 00	13,524 29	14,062 00	13,462 74	13,131 06	21,963 26
18,200 00	26,526 66	24,500 00	27,136 68	21,482 08	23,498 06	23,023 26	22,094 48	13,497 81
25,336 04	30,087 23	31,326 18	32,789 18	32,304 12	32,682 50	33,610 19	35,083 95	36,447 50
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APPENDIX

STATEMENT of Expenditure by the Marine Department

	1882.	1883.	1884.	1885.	1886.	1887.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Maintenance of lights—						
Above Montreal	71,048 50	70,116 68	70,788 27	70,697 89	85,718 98	75,690 74
Montreal District	21,643 06	22,260 82	22,946 43	23,262 94	33,289 28	16,735 49
Below Quebec	91,098 66	102,784 99	101,302 35	118,856 94	131,095 29	131,540 80
Nova Scotia	137,846 15	150,793 17	142,909 72	137,439 40	143,153 24	117,708 53
New Brunswick	66,073 00	75,947 92	86,670 70	92,130 28	76,046 63	96,425 38
Prince Edward Island	16,985 72	17,907 27	19,059 62	20,218 83	22,282 52	17,852 13
British Columbia	17,803 00	18,349 06	18,107 54	15,457 76	14,783 75	16,230 43
Cape Race						4,453 25
Construction—						
Above Montreal	13,581 00	9,782 27	18,432 63	27,977 42	36,678 16	18,383 20
Quebec	3,731 31	9,672 50	3,168 48	4,354 87	5,877 84	1,260 00
Nova Scotia	13,355 00	9,422 75	12,489 35	4,352 42	5,905 17	5,330 89
New Brunswick	2,253 80	1,022 57	2,868 70	7,667 42	2,421 66	5,280 75
Prince Edward Island	3,092 00	1,934 49	2,158 60	879 40		384 60
British Columbia	3,237 90	1,005 26	9,830 38	5,223 11	4,942 70	321 84
Queen's Printer						26 58
Dominion steamers—						
Quebec	44,923 98	45,156 13	43,019 13	51,092 98	51,485 03	50,714 52
Nova Scotia	31,049 74	37,841 07	27,726 60	42,921 27	30,283 27	32,287 10
New Brunswick					24,633 26	14,337 23
Prince Edward Island	23,911 97	19,680 00	19,539 52	33,962 54	20,927 58	19,987 67
British Columbia	8,504 61	25,484 00	16,111 83	12,485 07	13,430 69	10,809 07
Department						13,288 83
Examinations of masters and mates	3,982 00	4,021 20	5,580 79	6,656 44	5,239 28	4,858 98
Hudson's Bay expedition			480 69	71,374 69	35,217 10	14,762 61
Investigations into wrecks	863 19	875 64	830 12	385 15	592 63	520 14
Marine Hospital, Quebec	19,938 12	19,998 53	19,990 34	19,996 68	16,047 95	19,706 96
Marine Hospitals	33,162 45	29,880 78	31,401 30	45,371 29	32,229 02	32,545 35
Meteorological Service	47,464 07	51,990 25	56,418 16	56,625 46	56,898 33	57,140 74
Registration of Canadian shipping	2,013 28	168 84	189 27	237 88	157 13	233 13
Removal of obstructions	1,116 51	35 80	342 76	2,259 21	1,237 34	4,190 83
Rewards for saving life	2,212 00	2,534 60	2,614 91	5,221 15	8,147 22	7,363 94
Signal Service		3,365 33	6,704 17	3,881 05	4,622 00	5,082 17
Steamboat inspection	14,835 00	16,209 00	21,893 28	23,235 04	21,775 57	22,837 80
Hydrographic surveys		77 81	26,745 54	20,454 68	17,759 36	21,592 55
Water Police, Montreal	21,994 74	15,798 24	19,021 93	17,683 59	20,933 75	17,413 47
do Quebec	20,321 82	22,520 41	22,958 79	20,399 33	22,922 82	22,935 65
Civil Government	36,789 46	37,988 39	38,775 00	29,900 83	30,453 57	37,193 62
Steam communication—						
Between Quebec and Maritime Provinces						
Between Prince Edward Island and Mainland						
Repairs to wharf						
Purchase of steamer to replace—						
“Glendon”		395 55	56,164 71	47,238 03		
“Lady Head”						
Winter Mail Service, P.E.I.					5,985 42	6,312 93
Tidal observations						
Gratuities						
Survey, Burrard Inlet						
Export cattle trade						
Survey, Bay of Quinte						
Relief of distressed Canadians						
Manning ships						
Widow of late A. Warner						
McDonald Bros.						
Parliamentary Returns						
Investigating effect of Chicago drainage canal						
John McDonald						
	774,831 53	825,010 82	927,241 61	1,029,901 14	980,120 59	917,557 31

No. 11—*Concluded.*from Confederation to 30th June, 1896—*Concluded.*

1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
85,588 70	72,621 23	84,035 65	93,180 72	87,033 61	87,598 15	78,090 69	82,541 16	87,256 28
17,510 17	12,285 79	118,750 70	122,471 89	116,531 27	120,404 19	124,348 80	124,763 81	124,143 66
108,278 67	112,690 20							
133,009 92	140,197 15	139,459 56	139,916 83	148,815 26	150,445 26	137,339 73	140,877 53	123,234 65
73,465 49	78,285 79	61,608 91	61,089 31	66,886 69	71,079 46	59,917 96	69,654 46	63,018 64
14,796 62	19,118 51	16,968 80	19,000 46	17,069 98	16,819 64	15,569 39	17,976 67	17,988 15
19,604 63	16,877 12	16,411 49	19,595 22	26,858 68	24,413 27	27,240 77	21,734 18	24,770 44
5,124 20	7,358 01							
6,341 97	8,623 76	23,863 09	9,796 28	21,704 05	8,766 62	12,581 15	2,699 40	11,993 84
2,287 86	12,203 06		3,723 14	809 27	10,097 18	4,743 13	3,004 14	3,300 00
5,533 48	6,039 91		4,596 94	1,965 16	4,381 24	3,104 77	4,737 03	1,842 94
1,542 61	2,966 36		208 16	1,845 35	1,271 15	115 45	1,597 89	200 00
			410 00	1 56		1,604 00		
6,918 00	1,890 00		14,417 25	9,478 81	2,968 61	6,357 43	180 83	225 50
	40 14							
150,659 19	126,629 33	114,956 20	111,437 03	145,899 61	163,097 46	178,183 97	169,661 64	145,315 28
5,063 96	4,381 04	4,117 83	4,255 24	6,363 88	4,116 99	3,745 33	2,757 29	4,062 82
165 00								
513 91	516 67	888 94	1,172 77	603 21	643 49	850 81	351 15	483 98
18,777 62	18,643 14	10,279 08	751 75					
30,667 67	33,689 20	31,450 03	33,303 37	34,106 83	35,757 07	38,403 94	38,589 05	36,682 96
59,986 10	58,577 07	58,452 10	62,457 10	67,138 06	64,165 60	66,440 96	64,588 34	66,600 29
897 02	179 21	647 52	1,207 07	462 59	1,476 19	394 00	207 40	517 60
2,500 94	3,603 65	5,737 26	3,633 65	2,878 68	1,554 53	202 02	2,217 36	456 38
6,825 48	5,503 44	8,150 92	4,952 20	6,398 93	7,432 64	8,014 67	6,591 34	8,004 38
4,441 59	5,092 54	4,976 80	4,700 79	5,014 42	5,040 58	4,668 93	5,311 74	5,338 76
21,430 45	22,313 03	20,989 52	22,183 76	22,736 59	24,386 95	25,961 36	26,385 88	26,321 27
19,424 14	17,808 46	17,969 23	17,677 51	16,451 10	17,542 11	31,461 76	12,653 28	15,099 63
18,725 95	16,948 82	13,167 00	573 80					
18,553 57	14,698 68	8,620 61	7,279 85	6,161 60	5,436 23			
32,728 78	43,501 96	42,835 78	43,253 67	43,195 31	56,477 27	54,988 88	71,373 82	
	143,505 60				84 90	1,007 65	824 38	2,644 69
7,740 25	1,842 47	2,752 67	7,012 70	3,309 44	4,376 96	6,497 03	6,138 18	7,779 69
		244 75	1,888 71	711 59	5,099 17	10,172 61	11,507 24	9,627 45
	200 00	80 00	1,025 00			3,261 32		
			1,690 12	2,580 45	1,711 73	1,350 83	2,268 74	2,887 24
			520 85	1,411 57	2,085 45			
							7 30	
							500 00	746 89
							160 00	
							4,000 00	
								291 08
								2,500 00
								200 00
883,250 85	1,023,801 34	807,417 53	885,410 11	861,426 80	898,720 03	905,654 34	895,828 28	793,634 49

APPENDIX No. 12.

REPORT OF ALFRED OGDEN ON LIFE SAVING STATIONS.

BEDFORD, N.S., 20th October, 1896.

F. GOURDEAU, Esq.,
Deputy Minister of Marine and Fisheries,
Ottawa.

SIR,—I have the honour to submit herewith my report of inspection of life saving stations in the provinces of Nova Scotia and New Brunswick for the year 1896.

Pictou Island Station.

I inspected this station on the 27th June last, while on the island on business in connection with the Bay View Lobster Hatchery, and found the boat, boathouse and all appliances in first rate order.

Last spring the launch-ways were damaged by gales, but were soon after repaired at a trifling cost.

The old cork jackets referred to in my previous reports as being "tender and uncomfortable to the wearer" have not been replaced by new ones as I recommended.

Devils Island Station.

Inspected 30th September, boat and all appliances in good order. Coxswain died on the 17th September, and his successor had not been appointed, but the remainder of the crew had kept up the practice of drill as usual. One axe, 1-3 gallon water can and 1 iron bucket are required.

Port Mouton Island Station.

I arrived at this station 9th October, by government steamer "Lanadowne."

The boat and building are in good order but the launch-ways are in a very bad condition and will require to be newly constructed, at cost of about \$40 or \$50. In rough weather it is almost impossible to launch the boat without damage, and quite impossible to haul it up.

This is a rough place to keep a boat and a very important station, and strong substantial launch-ways should be constructed and avoid risk of loosing the boat by being smashed upon the rocks.

Blanche Station.

Inspected 9th October, boat, boat house and all appliances in good order, clean and tidy. The coxswain and crew of this station are always on the alert for wrecks, and is considered to be about the best on the coast. Twelve fathoms, 15 thread hemp rope is required for life lines and about 40 fathoms do., 9 thread for oar, lanyards.

Cape Sable Island.

Visited 9th October, at the station there is only a small metallic boat 15 keel, 5 feet 2 inches beam, with air-tight compartments forward and aft, together with air tubes running fore and aft between the compartments, on each side.

This boat was originally on board the steamer "Chesapeake" and has been on the island for about 33 years. It is heavy and unsuitable for the place.

I would recommend that a Beebe McLellan boat be supplied for this station with an organized crew which can be mustered from Hawk settlement (which is about 1 mile from the boat house) inside of an hour. The inhabitants are all fishermen and some excellent oarsmen are among them.

There are but three men living upon Cape Sable Islands, at the lighthouse.

Hawk passage, is about $\frac{1}{2}$ of a mile wide and about $\frac{3}{4}$ of a mile from the boat house and lighthouse.

There are no cork jackets at this station, I had recommended them in former reports, and think that it is important that they should be supplied.

Seal Island Station.

Inspected 10th October last, boat and all appliances in perfect order. Launched boat, exercised crew in rough water and was well pleased with the manner in which they handled it.

The boat at the west side of the island is kept in good order, but there are no cork jackets for the men. I would recommend that 6 jackets be supplied at once.

This Island is some 14 miles from the main land. There are 400 sheep and 10 head of horned cattle on the island.

The improvements to the dwelling house of the coxswain and crew, which I recommended last year, have not been made, as the materials had not been supplied.

Mud Island Station.

Inspected 10th October. This island is about 12 miles from the mainland, and is owned by the Mud Island Lobster Company, who receive a small subsidy from the department for supplying and maintaining a large dory 17 feet bottom, 21 feet on top, 6 feet beam and 2 $\frac{1}{2}$ feet hold. It has air-tight compartments forward and aft, is light, easily handled, and an excellent sea boat, and in good order.

There has been a hand trumpet on the island, which was of great value to the small and large craft approaching the island, but for some years it has been useless and has gone to destruction. I would recommend that a new one costing about \$15 be supplied at this station.

There are 4 men residing on the island in winter, and about 50 men in summer. There are 500 sheep and 3 cows also.

Yarmouth Station.

Inspected 10th October. Coxswain and crew were all absent, but I obtained the key of the boat-house and found everything in good order, except the launch-ways, which require repairs to the extent of about \$4 or \$5. I would recommend that the coxswain be authorized to make necessary repairs.

Cape Tormentine, N.B., Station.

Inspected 13th October. The boat and all appliances were in good order. In my report of 1894, I recommended that the following articles, which are absolutely necessary, be supplied :

Wood launch-ways, 150 feet long, 8 x 4 inch timber covered with flat iron 2 inches wide by $\frac{3}{8}$ inch thick, for the cradle or trolley to run upon; 1 double-barrel

winch; 200 feet $3\frac{1}{2}$ -inch manilla rope; two $8\frac{1}{2}$ -inch patent single blocks; 40 fathoms 9 thread hemp heaving line; one 3-gallon water keg; 1 can kerosine oil and lamp wicks; none of which have been supplied.

At the present time the boat cannot be safely launched except at high water, and cannot be hauled up at all at low water. Should the boat be required during a storm, with the wind upon shore and the tide low, I have doubts about the boat being got off at all.

This is an important station and I hope efforts will be made to make it efficient.

Scattarie Island Station.

I visited this station on the 3rd November by Dominion government steamer "Aberdeen." All of the crew were present, having just returned from practice in rough water. The boat and all appliances are kept in first-rate order.

As I reported last year, the windlass is not powerful enough for the work it has to do, and I would recommend that a double barrel winch and a 12-inch single block with steel bush and pin be supplied.

Six 3-inch brass scupper hinges will be required next season.

On this island there are 30 families of fishermen, who have 100 sheep and 25 head of horned cattle.

St. Paul's Island.

I inspected this station on the 7th November and found everything kept in good order.

There are two surf boats only at this station, one of which is new. The other is old and has been repaired many times; it is weak and some of the timbers are broken. Another boat is required, and as there are but four men at the main station, the surf boats are heavy for them to handle. I would recommend that a double dory with air-tight compartments fore and aft be supplied, and in the event of a wreck this dory could be launched and rowed off shore when a surf boat could not.

At Trinity Cove (north side) there is a boathouse and house of refuge, containing stove, fuel and oil, and there is telephonic communication with the main station.

The superintendent informs me that the old boat at this station is not the property of the government, and I am of the opinion that a dory, same as above described, would be suitable for this station also.

At the main station there is an old gun for throwing lines, but the superintendent informs me that it does not work well, and that Capt. Bloomfield Douglas, R.N.R., had tried it and pronounced it unfit for the place, and so reported to the department.

I would recommend that a new gun of modern pattern be sent to replace this one.

This island is 14 miles from Cape Breton Island. Together with the superintendent there are 6 men, 2 of which are lightkeepers, which leaves but 4 men at the main station.

I found a supply of provisions and clothing at the main station as follows:—

Ten barrels flour, 16 barrels bread, 5 barrels beef, 5 barrels pork, 1 barrel beans, 1 box coffee, $\frac{1}{2}$ chest tea, 7 gallons molasses, 11 blankets, 20 pairs pants, 20 coats, 20 caps, 20 shirts, 20 pairs brogans, 20 pairs socks.

White Head Station.

Inspected 14th November, boat, boathouse and all appliances in excellent order. The crew were all present.

Paint and oil, 2 lanterns, 1 can kerosine are required.

Herring Cove Station.

Inspected 27th November. Everything about this station is kept in good order. The boat is clean and nicely painted. Two new lanterns are required here to replace those which were broken last autumn while at wreck.

Duncan's Cove Station.

Inspected 27th November. Everything about this station is in good order, and nothing is required.

Sable Island.

I arrived by D.G.S.S. "Newfield" at the main station on the morning of the 12th December, and while supplies were being landed from the steamer, I had an opportunity of inspecting the boats and appliances.

Two new guns for throwing lines have recently been sent to the island from the agency at Halifax, but for want of fuse the superintendent had not been able to test them; he would, however, do so soon, as the fuse was then being landed from the "Newfield."

A portion of the launch-ways had recently been washed away, but materials were on hand to repair the old and construct new ones.

All of the boats were nicely painted and in first-rate order, all appliances well cared for and in their proper places.

The old despatch boat, which I reported upon in 1894 as being weak and unfit for the service, is still at the station, and I think should be replaced by a stronger one.

There is at the Marine and Fisheries wharf, Halifax, a very fine boat, constructed by Messrs. Embri & Sons, Port Hawksbury, N.S., for the Dominion Government, and was exhibited at the World's Fair, Chicago, which in my opinion is just what is required at Sable Island for the purpose of communicating with the mainland in case of emergency. This boat is strong, well built, an excellent sea boat, a good sailer, and of suitable size. It is partly open, but a hatch-deck can be easily and cheaply fitted. I would suggest that this boat, which has for three years been lying upon the wharf in Halifax, be sent to the island to replace the despatch boat now there.

The superintendent informs me that there are 50 persons on the island, including employees and their families.

The stock and provisions on hand consists of 100 horses, 90 horned cattle, 30 barrels flour, 10 barrels each of beef, pork, bread, beans and meal, and a good supply of hay, oats, potatoes and turnips.

I had no opportunity of visiting the other stations on the island, as it was night before the supplies were all landed from the "Newfield," and the steamer then sailed for the mainland.

At the houses of refuge and staff quarters I found everything clean and in good order.

I am sir,

Your obedient servant,

ALFRED OGDEN.

STATEMENT relative to Life-Boat Stations

Stations.	Established.	Coxswain.	Number of Crew.	Salary of Coxswain.	Wages of Crew.
Blanche, N.S.	Sept.—, 1895	W. A. B. Smith.	6	\$75 per annum and \$1.50 for each drill	\$1.50 each drill, twice a month.
Cape Sable, N.S.		Lightkeeper	No organized crew.		
Cobourg, Ont.	Nov. 7, 1882	D. Rooney	6	\$75 per annum and \$1.50 for each drill	\$1.50 each drill, twice a month.
Collingwood, Ont.	Sept. 2, 1885	P. Doherty.	6	do	do
Devil's Island, N.S.	1885, reorganized in 1890.	F. Edward	6	do	do
Duncan's Cove, N.S.	1886	R. E. Monk	6	do	do
Goderich, Ont.	Oct. 21, 1886	Wm. Babb.	6	do	do
Herring Cove, N.S.		J. Dempsey.	No organized crew.		
Mud Island, N.S.		J. Pitman	do	\$80	
Peléé Island, Ont.		A. Henning.	6	\$75 per annum and \$1.50 for each drill	\$1.50 each drill, twice a month.
Pictou Island, N.S.	Nov. 23, 1889	D. McLean	6	do	do
Poplar Point, Ont.	Apl. 20, 1883	L. Spafford.	6	do	do
Port Hope, Ont.	Nov. 6, 1889	C. R. Nixon	6	do	do
Port Mouton, N.S.	do —, 1889	J. Maxwell	6	do	do
Port Rowan, Ont.	Oct. 19, 1883	Richard Clark	6	do	do
Port Stanley, Ont.	June 25, 1885	Wm. Berry	6	do	do
Sable Island, N.S.	1885	Supt. Humane Establishment.	From staff of Humane Establishment.	Paid as superintendent and staff of Humane Establishment.	
Scatterie, N.S.	1885, reorganized in 1890.	J. N. Brown	6	\$75 per annum and \$1.50 for each drill	\$1.50 each drill, twice a month.
Seal Island, N.S.	1880	W. Trefry	7	\$250 per annum	\$100 each per annum.
St. Paul's Island, N.S.		Supt. Humane Establishment.	No organized crew.		
Tormentine Cape, N.B.		W. B. Walsh, Bayfield.			
Toronto, Ont.	Mar. 1, 1883	W. Ward	6	\$75 per annum and \$1.50 for each drill	\$1.50 each drill, twice a month.
Wellington, Ont.	do 17, 1883	H. McCullough	6	do	do
Whitehead, N.S.	June 6, 1890	H. P. Monroe	6	do	do
Yarmouth, N.S.	1886, reorganized in 1889.	John H. Gavel	6	do	do

maintained by the Dominion Government.

Value of Boat.	Description of Boat.	Equipment.	Where built.
\$			
575	Self-righting and self-bailing, 25 ft. over all, 8 ft. beam, Dobbins' pattern.	Full equipment, as required in regulation boat-house.	Dartmouth, N.S.
.....	Metallic life-boat, 16 ft. keel, 5 ft. beam....	Ordinary outfit.	
575	Self-righting and self-bailing, 25 ft. over all, 8 ft. beam, Dobbins' pattern.	Full equipment, as required in regulation boat-house.	Goderich, Ont.
575	do do	do do	do
575	do do	do do	Dartmouth, N.S.
575	do do	do do	do
575	do do	do do	Goderich, Ont.
....	Metallic life-boat, 28 ft. keel, 6 ft. beam....	Full equipment.....	New York.
....	Fishing boats and dorys (not Government property).	.....
575	Self-righting and self-bailing, 25 ft. over all, 7 ft. beam, Dobbins' pattern.	Full equipment, as required in regulation boat-house.	Goderich, Ont.
575	do do	do do	Dartmouth, N.S.
550	Self-righting and self-bailing, 26 ft. over all, 7 ft. beam, Dobbins' pattern.	do do	Buffalo, U.S.
620	do do	do do	Goderich, Ont.
575	do do	do do	Dartmouth, N.S.
....	Surf-boat, 26 ft. long, 6½ ft. beam.....	Full equipment and boat-house.	Buffalo, U.S.
575	Self-righting and self-bailing, 25 ft. over all, 7 ft. beam.	do do ..	Goderich, Ont.
.....	The two Dobbins' pattern boats were exchanged in 1893 for one Beebe surf-boat and carriages, and one Beebe McLellan self-bailing life-boat.	Boat-house, full equipments, &c.	
.....	Self-righting, &c., same as others, Dobbins' pattern, and clinker built ships' life-boat, 21 feet keel.	Full equipment and boat-house.	Dartmouth, N.S.
...	Beebe McLellan boat on east side and a surf-boat on the west.	do do	Halifax, N.S.
.....	Two surf-boats, one 25 ft. over all, 6½ ft. beam, the other 23 ft. long, 4 ft. 8 in. beam.	.....	do
575	Self-righting, &c., same as others, Dobbins' pattern.	Full equipment and boat-house.	Goderich, Ont.
1,400	do do	do do ...	Buffalo, U.S.
575	do do	do do	Dartmouth, N.S.
575	do do	do do	do

APPENDIX No. 13

REWARDS FOR SAVING LIFE.

List of persons to whom rewards have been granted by the Government of Canada, for the fiscal year ended 30th June, 1896, for gallant and humane services rendered in life saving from shipwrecked vessels, or by British and Foreign Governments for similar services rendered by Canadian vessels in saving life from shipwrecked British and Foreign vessels for the same period.

Names and Designations of Persons.	Nature of Services Rendered.	Date of Services Rendered.	Description of Reward.
Captain D. Smith, master of the barque "Kate F. Troop," of St. John, N.B.	Rescue of the barque "Torquato" of Castellamare in Italy, shipwrecked in the Atlantic Ocean.		A commemoration medal from the Italian Government.
Patrick Murphy of Quebec.	Bravery in rescue of several persons from drowning on different occasions.		A silver watch and \$25.
Captain Gaetano fu Gio Batta, master of the Italian barque "Orsola."	Rescuing at great risk the master and 11 of the crew of the barque "Lotus" of Pictou, N.S., sunk in the Bay of Biscay.	March 24, 1894	A gold medal to master, £17 paid for subsistence of crew and expenses incurred in landing crew at St. Vincent, Cape de Verde Islands; £15 paid for boat destroyed in rescuing crew.
Alex. McDonald, John McDonald, Alex. McDonald and John McQuarrie, of Little Mabou, N.S.	Saving at considerable risk a young boy and his sister, whose boat had upset.	Aug. 27, 1894.	A silver watch to each of the four men, value \$20 each.
Ronald McDonald, John McDonald, Alex. Gillis and Lewis McDonald.	Humane and gallant services in the rescue of two persons, whose boat had capsized in a squall near Port Hood, N.S.	Sept. 26, 1894.	A silver watch to each man, value \$20 each.
G. E. Pettis, master, Pleman Benzanson, 1st mate, John Leithburgh, Christian Gouley and Chas. Olsen, seamen of schooner "Gypsum Prince" of Windsor, N.S.	Heroic services in rescuing the captain and crew of the American schooner "B. H. Jones."	March 18, 1895	A gold watch and chain to master, a gold medal to mate and each of the three seamen, awarded by the President of the United States.
Captain C. E. Dixon, master of schooner "Osceola" of Windsor, N.S.	Promptness and energy displayed at the collision of the vessel with the steamer "Miramichi" and saving the lives of two passengers on the steamer.	Aug. 14, 1895.	A letter of thanks from the Minister of Marine and Fisheries.
Jas. A. Greenlaw, Eben Greenlaw, Frank Greenlaw, Edward Greenlaw, Harry Parker, Clarence Cline, Lorenzo Lambert, of Deer Island, St. Andrews, N.B.	Rescuing two persons in danger of drowning from the capsizing of their boat in a squall.	Sept. 16, 1895.	A letter of thanks from the Minister of Marine and Fisheries.
Samuel Walters, master, W. S. Stubbs, chief officer, R. Collins, G. Welsh, T. Redmond, G. Maguire, O. Dahlstrom and J. Hayes, seamen of SS. "Sachem" of Liverpool, G.B.	Services in rescue of brigantine "Gertrude" of Halifax, wrecked in a hurricane on a voyage from St. John's, Nfld., to Sydney, C.B.	Oct. 11, 1895.	A binocular glass to master, value £5; a gold watch to chief officer, value £15; £2 stg. to each of the seamen; £8.2.0d. was paid for subsistence expenses of shipwrecked crew on board the rescuing vessel.

REWARDS for Saving Life—*Concluded.*

Names and Designations of Persons.	Nature of Service rendered.	Date of Service Rendered.	Description of Reward.
Christen Ojernlosen, master of the ship "Prudhoe" of Arendal, Germany.	Kindness and humanity shown to the shipwrecked crew of the barque "Flora" of Charlottetown, P. E. I., rescued at sea.	Oct. 27, 1895.	A letter of thanks and commendation to master from the Minister of Marine and Fisheries.
Don Jose Calle, master, Don Domingo Arretequi, first officer, Faustino Totorica, Valentino Eu-Liera, Fozé Oyarbude and Vicente Galiano, seamen.	Rescuing after three attempts made at considerable risk of life, the crew of the schooner "Annie G. O'Leary," of Halifax, and kind and humane treatment given to shipwrecked crew.	Nov. 30, 1895.	A binocular glass to master, value £5; a gold watch to 1st officer, value £15, and £10 to each of the four seamen.
George Selig of Vogler's Cove, N.S.	Bravery and humane exertions in the rescue of two persons whose boat had capsized in a squall at Tobias Island on the coast of Lunenburg, N.S.	Dec. 3, 1895.	A binocular glass, value \$12.

APPENDIX No. 14.

STATEMENT of Sick Mariners' Dues collected for the fiscal Year ended 30th June, 1896.

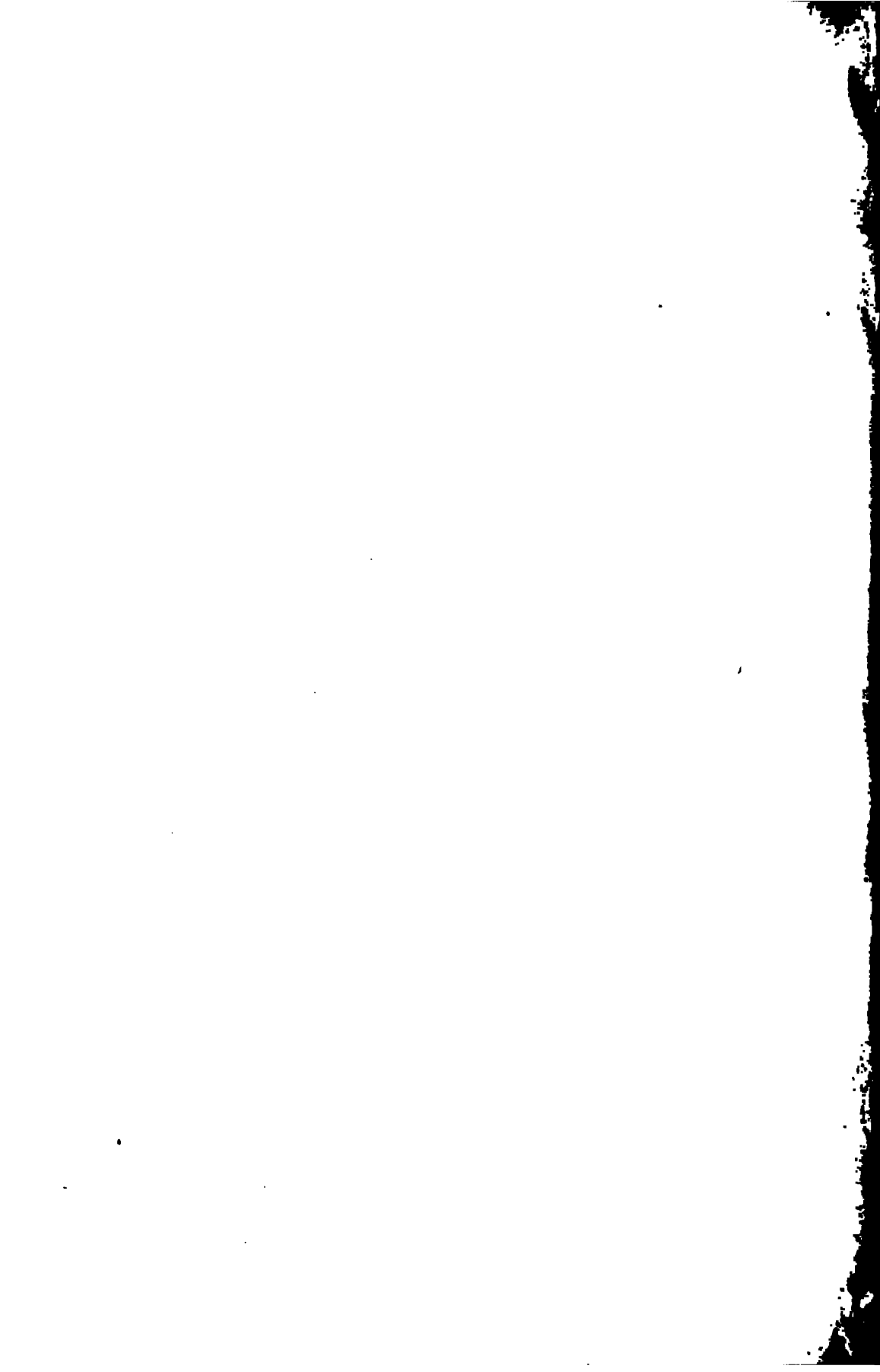
<i>Quebec.</i>	\$ cts.	<i>Nova Scotia—Continued.</i>	\$ cts.
Gaspé	82 96	Canso	180 00
Montreal	3,370 60	Digby	217 82
New Carlisle	271 32	Halifax	5,665 38
Perce	100 06	Kentville	13 00
Quebec	7,287 38	Liverpool	65 16
Rimouski	485 88	Lockeport	13 31
St. Armand	15 38	Lunenburg	569 88
St. John	1,487 50	Margaretsville	7 30
Sorel	11 56	North Sydney	1,088 44
Stanstead	22 46	Parrsboro'	1,281 88
Three Rivers	364 56	Pictou	347 98
Total	18,499 66	Port Hawkesbury	25 92
 <i>New Brunswick.</i>		Port Hood	15 46
Bathurst	186 20	Shelburne	80 96
Chatham	1,403 72	Sydney	2,720 20
Dalhousie	660 38	Weymouth	167 40
Dorchester	12 66	Windsor	1,048 50
Moncton	1,270 46	Yarmouth	408 14
Newcastle	764 14	Total	15,129 23
Sackville	216 80	 <i>Prince Edward Island.</i>	
St. Andrews	79 04	Charlottetown	300 12
St. John	5,364 40	Summerside	79 56
St. Stephen	69 50	Total	379 68
Total	10,027 30	 <i>British Columbia.</i>	
 <i>Nova Scotia.</i>		Nanaimo	2,325 34
Amherst	756 04	New Westminster	61 82
Annapolis	92 18	Vancouver	1,740 20
Arichat	110 30	Victoria	2,598 38
Antigonish	11 64	Total	6,725 74
Baddeck	245 54	Grand total	45,761 61
Barrington	6 54		
Bridgetown	2 64		

APPENDIX No. 15.

COMPARATIVE STATEMENT OF LIGHTHOUSES, &c.

DISTRICT.	Light-stations.	Lights.	Keepers.	Light-ships.	Fog whistles.	Fog-horns.	Fog-bells.	Fog-guns or bombs.	Whistling-buoys.	Bell-buoys.	Gas-buoys.	Steamers.
	*	*										
Province of Ontario.....	181	229	174	3	2	11	2	.....	.....	5	2	.....
Light-ships.....	3	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Province of Quebec.....	117	154	138	8	2	9	.....	9	.....	.....	10 (4 with bells)	2
Light-ships.....	8	8	.....	.....	3	.....	1	.....	.....	.....	.....	.....
Province of Nova Scotia.....	170	176	175	1	10	6	2	1	16	13	.....	2
Fog-alarms.....	2	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Light-ships.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Province of New Brunswick....	93	119	101	1	4	8	.....	1	4	3	.....	1
Fog-alarms.....	3	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Light-ships.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Province of P. E. Island.....	35	55	41	.....	.....	1	.....	.....	3	1	.....	S.S.
Province of British Columbia..	15	19	17	.....	1	5	4	.....	.....	1	.....	"Stanley." 2
	629	770	646	13	22	40	9	11	23	23	12	

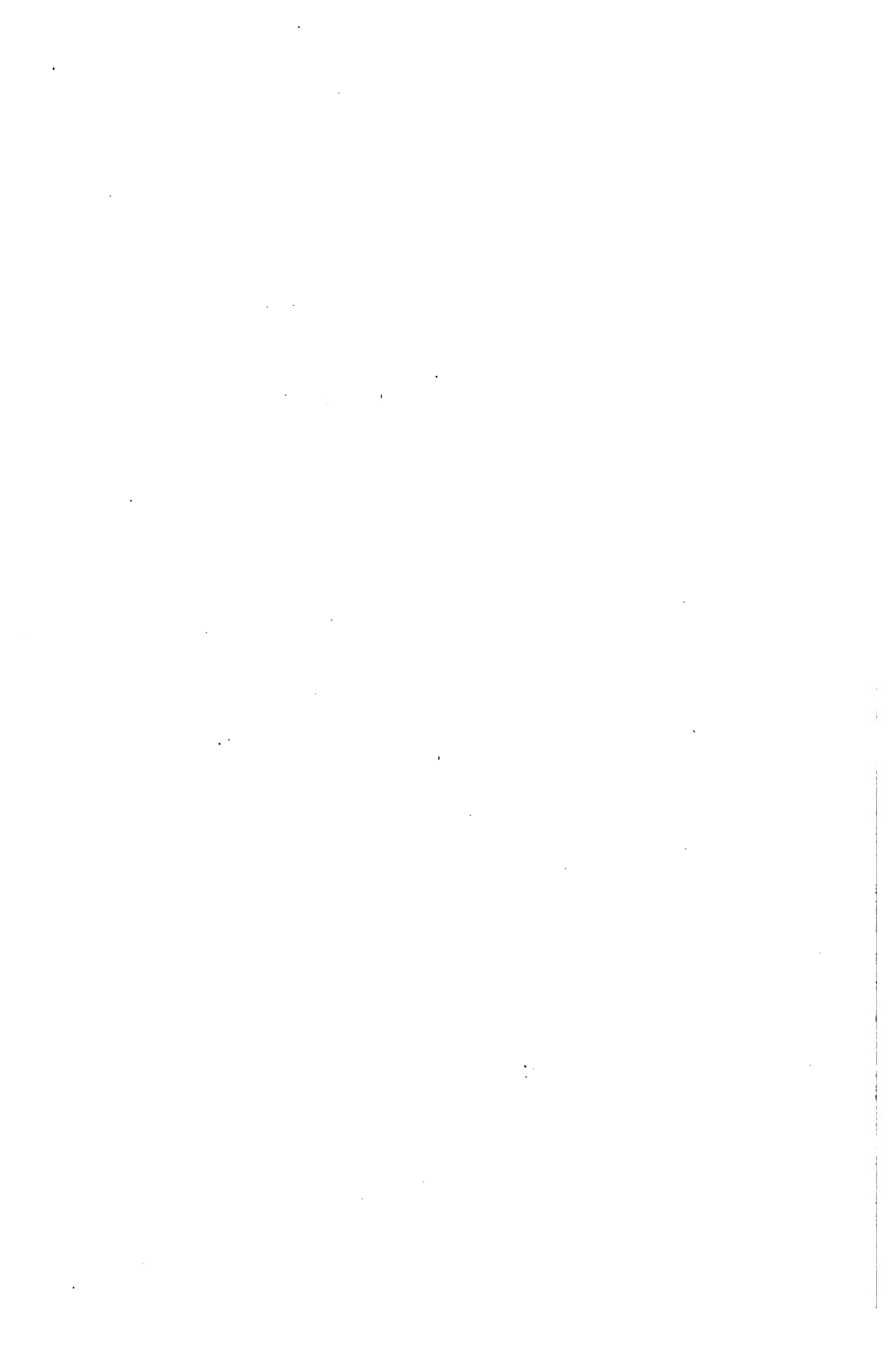
*Light-ships and fog-alarms where there are no lights are in these two columns included in the total number of light-stations and lights in the Dominion.











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